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Deprese a Beckova škála deprese: Normativní studie české verze a srovnání se zahraničními daty

Depression and the Beck Depression Inventory: Normative Study of the Czech Version and Comparison with Foreign Data

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Abstrakt

Diplomová práce se zabývá problematikou deprese a nástroji, které mohou přispět k její diagnostice. Pozornost je zejména věnována druhému vydání Beckovy škály deprese a hlavním cílem této práce je poskytnout normativní data získaná od rozsáhlého vzorku zdravých participantů pocházejících z české dospělé populace (N = 450; 18-96 let). Druhé vydání Beckovy škály deprese (BDI-II; Beck, Steer, & Brown, 1996) patří mezi nejznámější a nejčastěji využívané nástroje úrovně deprese. V analýze vztahu celkového skóru BDI-II k demografickým faktorům byla významná souvislost nalezena mezi pohlavím a vzděláním, avšak nikoli mezi BDI-II a věkem. Dle výsledků ženy projevovaly vyšší úroveň depresivních symptomů než muži, dále byla zjištěna také negativní korelace výsledku se vzděláním. Normy byly tudíž stratifikovány s ohledem na tyto dvě demografické proměnné. Tabulky s průměry, standardními odchylkami, percentily a standardními skóry jsou prezentovány jak pro celý soubor, tak pro demograficky stratifikované podskupiny. Dále byla zkoumána vnitřní konzistence, kdy úroveň Cronbachova alfa byla vysoká (alfa vyšší než .80). Korelace mezi jednotlivými položkami a celkovým skórem a faktorová struktura nástroje poskytly rámec pro porovnání těchto výsledků s výsledky zahraničních validizačních studií. Český vzorek, využitý v této studii, skóroval lehce, ale přesto v průměru níže než vzorky v zahraničních studiích, zatímco vnitřní konzistence, korelace mezi položkami a celkovým skórem a faktorová struktura odpovídaly výsledkům předešlých výzkumů. Byly rovněž pozorovány korelace některých položek a demografických charakteristik.

Data poskytnutá touto diplomovou prací mohou sloužit efektivnější a standardizovanější interpretaci skórů v BDI-II ve výzkumné i klinické praxi.

Klíčová slova: deprese, Beckova škála deprese, BDI-II, normativní data, psychometrické vlastnosti

Abstract

The thesis is dealing with the topic of depression and measurement instruments, which may contribute to its diagnostics and assessment. Special attention is dedicated to the Beck Depression Inventory, second edition, and the aim of this thesis is to provide normative data acquired from a large sample of healthy adult participants coming from the Czech Republic (N = 450; aged 18 to 96 years). The Beck Depression Inventory, second edition (BDI-II; Beck, Steer, & Brown, 1996) belongs among the most famous and most often used measures of depression severity. A significant relationship was found between the BDI-II total score and gender and education level, but not age. Women tended to score significantly higher than men on average, and a negative correlation between the BDI-II total score and education was found. Therefore, the normative data were analysed and stratified according to these two demographic variables. Tables, presenting means, standard deviations, percentiles and standard scores are provided for the total unstratified sample as well as for demographically defined subgroups. In addition, internal consistency of the Czech version was high (alpha above .80). The item-total correlations, and factorial structure of the instrument were investigated and the results were compared with results from foreign validation studies. The Czech sample, used in this study, scored slightly but significantly lower on average than samples in foreign studies, whereas internal consistency, item-total correlations, and factorial structure evinced results similar to previous research. Correlations were observed also between demographic characteristics and single BDI-II items.

The data provided may serve for more efficient, evidence-based and standardised interpretation of scores in the BDI-II in both research and clinical practice.

Keywords: depression, Beck Depression Inventory, BDI-II, normative standards, psychometric properties

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List of Acronyms

ADIS-IV	Anxiety Disorders Interview Schedule
ATQ	Automatic Thoughs Questionnaire
AUDIT	Alcohol Use Disorders Identification Test
BAI	Beck Anxiety Inventory
BDI	Beck Depression Inventory
BDI-IA	Amended Beck Depression Inventory
BDI-II	Beck Depression Inventory, second edition
BDI-FS	Beck Depression Inventory-Fast Screen for Medical Patients
BDI-PC	Beck Depression Inventory for Primary Care
BDI-SF	Beck Depression Inventory-Short Form
BDI-V	Applied version of the Beck Depression Inventory
BHS	Beck Hopelessness Scale
BMIS	Brief Mood Instrospection Scale
BPRS	Brief Psychiatric Rating Scale
CES-D	Center for Epidemiological Studies' Depression Scale
DASS	Depression Anxiety Stress Scale
DAST	Drug Abuse Screening Test
DIS	Diagnostic Interview Schedule
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders – Third Edition, Revised
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition, Text Revision
DSM-5	Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition
EEG	Electroencephalogram
EHIS	European Health Interview Survey
EPDS	Edinburgh Postnatal Depression Scale
GABA	Gamma-aminobutyric acid
GDS	Geriatric Depression Scale
HADS-D	Hospital Anxiety and Depression Scale – depression subscale
HANDS	Harvard Department of Psychiatry/National Depression Screening Day Scale
HAM-A	Hamilton Anxiety Rating Scale
HDI	Hamilton Depression Inventory

HRSD	Hamilton Rating Scale for Depression
HPA axis	Hypothalamic-pituitary-adrenal axis
ICD-10	International Statistical Classification of Diseases and Related Health Problems – 10th Revision
MADRS	Montgomery-Åsberg Depression Rating Scale
mBDI	Modified Beck Depression Inventory
MMPI-2-D	Minnesota Multiphasic Personality Inventory 2 Depression Scale
NREM	Non-rapid eye movement
PAF	Principal axis factoring
PAI	Personality Assessment Inventory
PES	Pleasant Events Schedule
PRIME-MD	Patient Health Questionnaire
RDSI	Reynolds Depression Screening Inventory
REM	Rapid eye movement
ROC curves	Receiver operating characteristic curves
SADS	Schedule for Affective Disorders and Schizophrenia
SCID	Structured Clinical Interview for DSM-III-R
SCID-5	Structured Clinical Interview for DSM-5
SCID-I/P	Structured Clinical Interview for DSM-IV – Patient Version
SCL-90-R	Symptom Check List
SDS	Zung's Self-Rating Depression Scale
SRRS	Salpêtrière Retardation Rating Scale
SSI	Scale for Suicide Ideation
STAI	State-Trait Anxiety Inventory

Introduction

Depression is one of the most prevalent psychiatric disorders worldwide (Alda, Höschl, & Libigerová, 2004) as well as in the Czech Republic (Daňková, 2011). Detailed knowledge of the patient, diagnostic criteria as well as effective combination of methods of assessment of depression may help early detection of the disorder and appropriate treatment design (Hopko, Lejuez, Armento, & Bare, 2004). This may help to prevent comorbidity, often observed in depression (Richards & O'Hara, 2014), and an increased mortality of patients with depression (American Psychiatric Association, 2013).

Among effective auxiliary measures, which may serve to screening for depression and evaluation of efficacy and effectiveness of treatment or the patient's development, self-report measures of depression may be categorised. Although there are about 80 of them nowadays (Nezu, Ronan, Meadows, & McClure, 2000), the Beck Depression Inventory belongs among the most famous ones, used in both research and clinical practice (Richter, Werner, Heerlein, Kraus & Sauer, 1998). More than 100 studies aimed to evaluate the psychometric properties of its second edition with different samples and different versions of the questionnaire (Wang & Gorenstein, 2013b) and many authors reported sound psychometric properties (Dozois, Dobson & Ahnberg, 1998) as well as high reliability in measuring depression severity (Subica et al., 2014).

Nonetheless, despite of the high number of studies on this questionnaire, standardisation samples were often not exhaustively representative of the population they came from and not enough attention has so far been paid to culture fairness of both total scores and items. Hence, it was suggested to develop local norms for each language and country (Wang & Gorenstein, 2013b).

Not only depressive symptoms may differ throughout various cultures and countries (American Psychiatric Association, 2000), but also mental health measures may yield to culturally-relevant bias because of inappropriateness, different cultural meanings (Van de Vijver & Tanzer, 2004) and behaviour of the participants (Van de Vijver, 2002). Therefore, it was suggested to develop normative standards taking different cultures (Abubakar et al., 2016) and their history (Jakšić, Ivezić, Jokić-Begić, Surányi, & Stojanović-Špehar, 2013) into consideration.

The Czech version of the Beck Depression Inventory, second edition (BDI-II; Preiss & Vacíř, 1999), was assigned to a small sample of participants in order to test its Czech translation. No psychometric properties, except for mean, standard deviation and range, were nevertheless tested and no normative standards were therefore derived for Czech population. Although this

inventory was often used in both research and clinical practice thanks to its cost-effectiveness and straightforwardness, foreign normative data were used to determine the position of the tested individual in comparison to the rest of the population, which was found insufficient (Gottfried, 2015).

The present thesis deals with this topic, since it aims to develop normative standards for the BDI-II for Czech adult population, which will allow a more effective and standardised use of this instrument.

In the theoretical section, depression as a disorder measured by the BDI-II will be described. In order to better comprehend the context in which the instrument was developed, depression will be defined, classified and depicted in terms of its symptoms. The BDI-II consist of 21 items addressing each of the symptoms on its own. The chapter 1.3 – Symptoms of Depression, divided to Somatic-affective and Cognitive symptoms, will therefore refer to each of them and explain how they are described in main classifications, what current research is focused on and how they influence life of a depressed individual. Neuroanatomical, neuroendocrinological and neurophysiological correlates, development and differential diagnostics of depression will be presented as well. Different tools assessing symptoms of depression and their severity will also be introduced. The history of the BDI-II and adjustments within its editions will be described and its administration, scoring, use and information on the Czech version will be presented. An overview of psychometric properties of the questionnaire, their relation to demographic data and its factorial structure will be presented to investigate similarities and differences of various foreign studies. This topic is rather broad, special attention will therefore be dedicated to foreign studies with non-clinical samples aiming to develop norms for their language version and validate the inventory, and also to psychometric properties later investigated in the empirical section.

The empirical section will focus on development of normative standards for Czech adult population. During the development of normative standards the connection of demographic variables (gender, age and education) is expected in concordance with previous research (e.g. Gomes-Oliveira, Gorenstein, Neto, Andrade, & Yuan Pang, 2012; Jakšić et al., 2013; Roelofs et al., 2013), therefore it will first be investigated if a similar association may be found in our data. According to scores of the sample coming from Czech adult population, normative standards adjusted according to appropriate demographic characteristics will be provided. Normative standards should be a contribution for Czech professionals, since to our knowledge, no normative study on the BDI-II has so far been published for the Czech version. In addition, correlation between items and different demographic variables will be counted in order to

contribute to qualitative analysis of participant's responses. Moreover, the internal consistency, item-total correlations and factorial structure will be investigated and then compared with results of previous normative and validation studies from different countries.

I. Theoretical Section

1 Depression

The BDI-II was developed in order to replace its previous versions, namely the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock & Erbaugh, 1961) and the amended Beck Depression Inventory (BDI-IA; , and to correspond to the criteria stated in the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV) for assessment of depressive disorders (Beck, Steer, & Brown, 1996).

The first edition of the Beck Depression Inventory (BDI) was developed during the course of the psychoanalytic psychotherapy of depressed patients and the items corresponded to symptom-attitude categories based on the author's observations (Beck, Ward, Mendelson, Mock & Erbaugh, 1961). The amended version of the Beck Depression Inventory (BDI-IA; Beck & Steer, 1987) was supposed to overcome difficulties of the BDI emerged due to the change of the diagnostic context over the years (Arbisi, 2001). Other issues were also relevant: a poor discrimination among different levels of depression severity as well as slight gender bias evinced by certain items (Santor, Ramsay, & Zuroff, 1994), which lead to rewording of 15 out of 21 items (Beck & Steer, 1987).

The newest revision of the BDI was instigated by the subsequent issues of the Diagnostic and Statistical Manual of Mental Disorders – Third Edition, Revised (DSM-III-R; American Psychiatric Association, 1987) and Fourth Edition (DSM-IV; American Psychiatric Association, 1994) and the need for a new psychological means for assessment of symptoms corresponding to the criteria listed in the DSM-III-R and the DSM-IV. Certain items were reworded in order to achieve better comprehensibility or to reflect both increases and decreases in symptom manifestation and other were included to completely address the DSM-IV depression criteria (Beck, Steer, & Brown, 1996).

Therefore, to fully comprehend the concepts which the BDI and its revisions were based on, it is necessary to present an overview of symptoms of depression as they tend to influence the score in the inventory. Depression will be defined, classified according to the most important classifications of mental disorders and its psychological, clinical and neurobiological aspects will be described in the following chapters.

1.1 Definition

Depression is, in a much broader sense, a decrease of a certain phenomenon. In this case, it is a decrease of mood, but also a psychomotor deceleration, a decrease of speed of visceral functions and dynamogenesis (Kučerová, 2013).

Many different terms expressing its nature can be encountered in literature, for example melancholia (somberness and gloom), lethargy (indifference, numbness, nonchalance and somnolence), apathy (impassivity, obliviousness), indolence (inclination to laziness) or malaise (disquiet and unease) (Křivohlavý, 2013).

Alda et al. (2004) characterise depression as a state of "sadness, hopelessness, feelings of guilt, insufficiency, hypochondria, somatic and vegetative difficulties, suicidal thoughts or attempts, sleeping disorders, sexual dysfunctions, anxiety, pessimism, loss of interest or attention, eating disorders, pains, psychomotor deceleration or agitation and sometimes obsessive symptoms, paranoia or derealisation". They also list different types of depression, for instance short-term or long-term reactions to various life events, depression as a component of neurosis or different psychiatric disorders, an endogenous disorder characterised by altered receptor sensitivity, masked depression involving somatic difficulties, symptomatic depression accompanying certain illnesses, depression in case of organic brain impairment or drug-induced depression.

Beck, Steer and Brown (1996) warn against diagnosing with depression after assigning merely the BDI-II, as it may emerge in relation to a wide range of other disorders, such as panic disorder or schizophrenia. Furthermore, patients with other mood disorders, for example dysthymic or bipolar disorders, may fulfil some items of the criteria stated in the DSM-IV (Beck, Steer, Ball, & Ranieri, 1996) and therefore attain a higher score in the inventory. Nevertheless, next chapters will be focused mainly on the symptoms and classification of major depressive episode, as a building block for disorder diagnoses (American Psychiatric Association, 1994), and major depressive disorder, as a separate entity able to be diagnosed, since the BDI-II covers their symptoms entirely.

1.2 Classifications

Major depressive episode, as characterised by the DSM-IV, is a state of depressed mood or the loss of interest and pleasure in almost all activities, which can be altered by irritability rather than sadness in children and adolescents, lasting for at least a period of 2 weeks and persisting for most of the day. The state must emerge newly or must have deteriorated in comparison to the state before the episode. In addition, it is necessary that the patient experiences at least four symptoms listed among features appearing along the aforementioned ones: changes in appetite or weight, sleep, psychomotor activity, decreased energy, feelings of worthlessness or guilt, difficulty thinking, concentrating or making decisions, thoughts of death or suicidal ideation,

plans or attempts. Daily activities must also be disturbed or carried out only with difficulties (American Psychiatric Association, 1994).

Major depressive episode appears in the first part of the chapter "Mood Disorders" of the Diagnostic and Statistical Manual of Mental Disorders, which is dedicated to mood episodes. Therefore, it did not receive its own diagnostic code and cannot be diagnosed separately. Nonetheless, together with other mood episodes, such as manic episode, mixed episode or hypomanic episode, it is a structural component for diagnoses of disorders, including major depressive disorder and bipolar disorders (American Psychiatric Association, 1994).

Major depressive disorder comprises one or more major depressive episodes. In order to be diagnosed with this disorder, no previous history of manic, mixed or hypomanic episodes must exist and the symptoms must not account for physiological effects of substance abuse or medication. It is important to distinguish whether it is a single episode or recurrent, which is defined by two or more episodes divided by at least 2 subsequent months, when the criteria for major depressive episode were not met. The diagnose is given a five-digit diagnostic code, where the first three numbers indicate major depressive disorder (296), the fourth digit differentiates between a single episode or recurrent form and the fifth clarifies the present state (American Psychiatric Association, 1994).

Since the BDI-II was released in 1996, it is important to mention the changes which were introduced in the subsequent editions of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) and Fifth Edition (DSM-5; American Psychiatric Association, 2013). Whereas the DSM-IV-TR did not alter the definition or classification of major depressive episode except for updating the sections of laboratory and functional brain imaging results, the DSM-5 re-evaluted the previous classification of Mood Disorders, which are now divided into Bipolar and Related Disorders and Depressive Disorders.

Major depressive episode and major depressive disorder involve the same symptoms in both the DSM-IV and the DSM-5, although Major Depressive Episode appears separately as a component of Bipolar I Disorder, Bipolar II Disorder and Major Depressive Disorder. The main difference between the appraisal of major depressive episode or major depressive disorder based on these two editions of the DSM lies in evaluation of a state of a bereaved individual. Whilst according to the DSM-IV the patient is not considered in major depressive episode or diagnosed with major depressive disorder unless the symptoms endure for longer than 2 months or they fulfil certain criteria (American Psychiatric Association, 1994), the DSM-5 notes that grief often remains in existence for 1 or 2 years and therefore only gives an overview of

differences between major depressive episode and bereavement, while rendering this decision to an individual clinical judgment (American Psychiatric Association, 2013). For a comparison of the two crucial versions of the Diagnostic and Statistical Manual did not reveal any major differences, it can be inferred that despite the fact that the BDI-II was constructed so as to correspond to the criteria listed in the older version, it concurs with the DSM-5 as well and therefore its research is still relevant.

Another classification of mental disorders worth mentioning is beyond dispute the International Statistical Classification of Diseases and Related Health Problems – 10th Revision (ICD-10; World Health Organization, 1993). The fourth chapter, Mood (Affective) Disorders, of the fifth part, Mental and Behavioural Disorders, includes diagnoses of Depressive Episode (F.32) and Recurrent Depressive Disorder (F.33), which are in accordance with Major Depressive Episode and Major Depressive Disorder according to the DSM. The main difference is that depressive episode can be diagnosed on its own, whereas recurrent depressive disorder is composed of a number of episodes, which are detached by a few months. Although both the classifications state basically the same symptoms which are present in an episode, to be diagnosed with a mild episode according to the ICD-10, one has to evince at least two out of the three most typical symptoms (depressive mood, loss of interest and enjoyment and reduction of energy) and two from the list of other symptoms, which is less than in the DSM, which requires five or more. Besides these differences, it is possible to assert that the BDI-II is in agreement with this classification in spite of the fact that it was created to suit the DSM-IV, and therefore very useful even in fields and environments where professionals prefer the ICD-10 to the DSM.

1.3 Symptoms of Depression

The following chapter is dedicated to symptoms of depression, which are presented in connection to the items of the BDI-II and classified according to the factorial structure of the questionnaire. Since its release numerous studies on its factor analysis have been published and the most important ones will be reviewed in the chapter devoted to the psychometric properties of the BDI-II. Due to many different results of these studies the symptoms will be grouped into two chapters according to the first analysis performed by Beck, Steer and Brown (1996) and stated in the manual for the BDI-II, which distinguishes a somatic-affective and a cognitive factor.

Furthermore, although the authors created 21 items of the BDI-II to reflect symptoms of depression as listed in the DSM-5, these are often explained and described in the manual as

clusters of similar nature. Therefore, some of the symptoms are presented as a group of two or more symptoms.

In the following table the symptoms are listed according to the factors and in the order within the factor group as they are mentioned in the DSM-5. The symptoms are named to address the names of items in the BDI-II.

Enumeration of symptoms of depression according to the BDI-II items	
Somatic-affective	Cognitive
Crying	Sadness
Irritability	Pessimism
Loss of Interest	Worthlessness
Loss of Pleasure	Guilty Feelings
Loss of Interest in Sex	Past Failure
Changes in Appetite	Punishment Feelings
Changes in Sleeping Pattern	Self-Dislike
Agitation	Self-Criticalness
Loss of Energy	Suicidal Thoughts or Wishes
Tiredness or Fatigue	
Indecisiveness	
Concentration Difficulty	

Table 1. Somatic-affective and cognitive symptoms of depression based on factor analysis by Beck, Steer and Brown (1996)

1.3.1 Somatic-affective symptoms

Crying

Although certain depressed individuals tend to deny their sadness, their mood may be visible to their environment since they often may seem tearful (American Psychiatric Association, 2013) and this inclination to weep may be referred to as “lacrimosity” (Alda et al., 2004). Crying is tested by the tenth item of the questionnaire.

Vingerhoets, Rottenberg, Cevaal and Nelson (2007) stated that whereas scores on the item measuring levels of crying in the BDI and the BDI-II revealed moderate correlation with severity of depression, there was not sufficient empirical evidence for the conviction that

depression was associated with higher levels of weeping and bursting into tears easily or, on the contrary, not being able to cry at all. Moreover, diagnostic instruments and systems of assessment do not approach this symptom consistently. To evaluate the level of crying, it is necessary to take gender, premorbid characteristics, possible effects of medication and circumstances into account. Whilst depressed women tend to shed tears more often than depressed men, depressed individuals have a tendency to lose their ability to cry more often than their healthy counterparts.

Regarding gender, Romans and Clarkson (2008) argued that introducing crying as a symptom of depression and involving it in questionnaires measuring it may engender and explain higher rates of depression found in women since overt expression of tearfulness tends to be more common in them, while men rather evince higher levels of anger or irritability. Furthermore, the evaluated person may have a lower level of introspection into their emotional state or may not appear depressed, which may complicate the diagnosis.

Nevertheless, crying in depression appears to have neurobiological correlates, since according to Sacher et al. (2014), greater density of monoamine oxidase-A was found in the prefrontal and anterior cingulate cortex during postpartum depression or when studied women evinced higher tendency to crying, which is a symptom of postpartum depression.

Irritability

Irritability may often appear in depressed children and adolescents, since it tends to replace typically sad mood, but many adults report or evince higher levels of continuous anger and answering to minor issues in rage, by accusing others or excessive frustration. These reactions, especially before attaining adulthood, should be distinguished from common irritated responses to frustration (American Psychiatric Association, 2013). Reference to irritability can be found at the seventeenth item of the questionnaire.

Fava et al. (2009) argued that irritability was a convenient symptom for depression even in adult population, since results of their study suggested that irritability was present in episodes of major depression even alongside sad mood and loss of interest. In addition, it occurred mainly in younger patients with early onset of the disorder, lifetime duration, comorbidity with anxiety and impulse-control disorders, tiredness, self-blame and physical impairments. Winkler, Pjrek and Kasper (2005) observed that irritability was more common in depressed men than women.

Depressed students with irritability were more likely to experience a higher severity of depressive symptoms with women perceiving more anxiety and men reporting more perioeds

of risky behaviour and alcohol and drug consumption (Pedrelli et al., 2013). In children, irritability was linked to disruptive behaviours, particularly in the female part of the sample (Stringaris, Maughan, Copeland, Costello, & Angold, 2013).

Interestingly, it was found that trait anger and anger expression was evinced by healthy controls more than by elderly with depression. By contrast, in the sample of depressed older adults, trait anger, state anger, anger expression, lowered anger control, physical aggression, hostility, higher rate of angry responds to unpredictability and embarrassment and personal disrespect were linked to severity of the disorder (Baeg, Wang, Chee, Kim, & Kim, 2011). Patients with higher anger and hostility also showed decreased response to treatment (Fisher et al., 2015). Depressed patients with anger attacks tend to evince traits of suicide-related behaviour and dysfunctions, irritability, anxiety, psychoticism and poorer quality of life (Painuly, Sharan, & Mattoo, 2007).

Loss of Interest and Loss of Pleasure

Loss of pleasure and interest in most of the activities is a crucial symptom of depression, since to receive a diagnose of major depressive episode an individual must evince signs of this loss and/or depressed mood. Patients tend to stop caring about their hobbies they used to enjoy and their pursuance does not provide the joy it used to. This change may be discerned by either the depressed individual or their friends or family (American Psychiatric Association, 2013). The BDI-II refers to loss of interest and loss of pleasure by the twelfth and the fourth item of the questionnaire.

A significantly reduced interest in activities previously considered enjoyable and ability to perceive pleasure can be referred to as anhedonia (Ribot, 2006) and more recently, due to a reappraisal of the approach to reward-related processes, anhedonia is regarded as deficits in hedonic capacity and connected to reward valuation, decision-making, anticipation and motivation (Gaillard, Gourion, & Llorca, 2013). Grillo (2012) suggested that anhedonia might engender decrease in processing sensory information by reducing the pleasure linked to their connection and interpretation and thus lead to distortion of perception of one's environment. This misinterpretation might cause anxiety and confusion.

Winer et al. (2014) reported that anhedonia was found to be a robust predictor of suicidal ideation, with loss of interest, as one of its components, being the most significant. Anhedonia was nevertheless not connected to previous suicide attempts (Winer, Drapeau, Veilleux, & Nadorff, 2015).

Treadway and Zald (2011) argued that clinical diagnosis of anhedonia failed to distinguish between two essential components, a decline in motivation and experienced pleasure. Therefore, they introduced a refined definition of anhedonia, discriminating decreased pleasure experienced when responding to a reward ("consummatory anhedonia") and reduced motivation when seeking for rewards ("motivational anhedonia"), which roughly correspond to the concept of "liking" and "wanting" as components of reward-processing (Berridge & Robinson, 2003). They further suggested that anhedonia reflected not only a type of a state or a mood, but also an impaired decision-making in the context of reward and hence they presented the term "decisional anhedonia" to reflect this influence (Treadway & Zald, 2011).

Anhedonia is specifically connected to reduced volume of nucleus accumbens and its responses to rewards as well as increased resting EEG delta activity (Wacker, Dillon, & Pizzagalli, 2009) and lower dopamine transporter binding in the caudate, the putamen and the striatum (Sarchiapone et al., 2006). In response to personally relevant happy stimuli anhedonia correlates positively with activity in ventromedial prefrontal cortex and negatively with activity in the amygdala and the ventral striatum (Keedwell, Andrew, Williams, Brammer, & Phillips, 2005).

Loss of Interest in Sex

Decline in sexual interest and desire in comparison to premorbidity may appear in some individuals (American Psychiatric Association, 2013). Anorgasmia in women or erectile dysfunctions in men may occur, as well as difficulties in intimate relationships and marriage (American Psychiatric Association, 2000). Loss of interest in sex is addressed by the last item of the questionnaire.

Sexual impairments in depression may cover a wide range of dysfunctions, such as reduction in sexual cognition and fantasy, arousal or global evaluation of sexual function. Some impairments, for example orgasm, are closely connected to use of antidepressant medicine (Cyranowski, Frank, Cherry, Houck, & Kupfer, 2004), whilst other, for example arousal, physical pleasure and emotional satisfaction, are reported even during remission of major depressive disorder (Cyranowski, Bromberger et al., 2004).

Depressed individuals with sexual dysfunctions reported lower marital satisfaction than depressed individuals without them (Alahveriani, Rajaie, Shakeri, & Lohrasbi, 2010) and loss of desire, excitement and ability to achieve orgasm was linked to thoughts of death in patients with unipolar depression (Dell'Osso et al., 2009).

Neurobiological systems, which engage in mood regulation, are often involved in sexual functions as well. Dysfunctions of hypothalamic-pituitary-adrenal (HPA) axis can influence hypogonadism, which manifests in low sex steroid levels, and depression was also connected to its changes (Michael & O'Keane, 2000). Dopamine reduction was observed to be involved in anhedonia and decreased ability to perceive pleasure (Dunlop & Nemeroff, 2007) and its receptors activate sexual reactions, for example erection (Feldman & Larsen, 2014). Several biological factors, such as genetics or female gender, may deregulate serotonergic transmission and thus contribute to the risk for depression development (Jans, Riedel, Markus, & Blokland, 2006), whilst serotonin receptors are involved in sexual functions by either facilitating or inhibiting libido, erections and ejaculation (Michael & O'Keane, 2000). Norepinephrine transmission disruption was also observed to be involved in both depression (Delgado & Moreno, 2000) and sexual arousal, orgasm, vasoconstriction and erection inhibition (Feldman & Larsen, 2014). Hintikka et al. (2009) suggested that scores in the BDI and the HAMD correlated negatively with testosterone levels and sexual desire.

Changes in Appetite

Depressed individuals have propensity to lose their appetite and eat only under pressure or experience increase in appetite or cravings for particular type of sustenance. The latter can usually be observed in outpatients. These changes may lead to weight gain or loss or difficulties to meet age weight standards in children. In order to consider the change of weight a fulfilled diagnostic criterion in adults, it must exceed 5% of body weight in a month (American Psychiatric Association, 2013). The loss of appetite may reach the dimension of anorexia, weight gain may be linked to the mechanism of self-rewarding. Depressed individuals then often undergo an examination of their alimentary canal first (Alda et al., 2004).

Severity of depression was linked to lower quality of diet, particularly higher consumption of saturated fat, sugar and sodium in women with major depressive disorder and obesity (Appelhans et al., 2012) and adolescents with depression were significantly more likely to reach a level of sever obesity than adolescents without depression at a weight management clinic (Fox, Gross, Rudser, Foy, & Kelly, 2016).

Depressed individuals with augmented appetite exhibit increased hemodynamic activity to food stimuli in the left orbitofrontal cortex and bilateral insula as opposed to depressed individuals with loss of appetite, and vetral striatum, putamen, ventral pallidum and additional regions of the orbitofrontal cortex when compared to both depressed patients with loss of appetite and healthy controls. Depressed individuals with loss of appetite evinced less activity

in the bilateral anterior- and mid-insula than depressed individuas with augmented appetite and healthy controls (Simmons et al., 2016). Andréasson, Arborelius, Erlanson-Albertsson, and Lekander (2007) suggested that impaired appetite in depression might be connected to the role of proinflammatory cytokines linked to the increase immune reaction during depression. Cytokines and a cytokine-like peptide leptic, whose release is stimulated by them, have anorectic properties and influence the HPA axis, the sympathetic nervous system and the immune system, which may disconcert energy balance in the body.

Changes in Sleeping Pattern

Disturbed sleep becomes sometimes the motive why the person with depression looks for professional help in the first place. The difficulties with sleep range from more common middle or terminal insomnia, signifying the inability to fall asleep again after having woken up during the night or too early, through initial insomnia, when the depressed individual experiences problems when falling asleep, to less frequent hypersomnia and oversleeping lengthening the sleep episodes or engendering frequent daytime sleep (American Psychiatric Association, 2013). Biological rhytms are often disrupted even during euthymic inter-episode period (Mondin et al., 2017). Changes in sleeping pattern are addressed by the sixteenth item of the questionnaire.

Alterations in EEG activity may be found in 40% to 60% of outpatients and up to 90% of inpatients diagnosed with a major depressive episode and may often endure after clinical remission or become one of the first symptoms before the onset of a major depressive episode in high-risk population, such as first-degree family members. Among the polysomnographic disturbances which appear the most belong abnormalities in sleep continuity, for instance longer sleep latency, augmented intermittent wakefulness, and early morning awakening, decreased non-rapid eye movement (NREM) stages 3 and 4 and a reduction of the first NREM period, reduced latency of rapid eye movement (REM), increase of phasic REM activity and duration of REM periods at the beginning of the night (American Psychiatric Association, 2000). REM-latency can be consider a marker of depression (Alda et al., 2004).

Depressed individuals with a history of suicide attemps evincing melancholic features of depression were found to experience a higher frequency of nightmares and middle and terminal insomnia than melancholic individuals with no such history. These findings were not related to individuals with no melancholic features. It was suggested that this fact may be linked to characteristics of melancholic features of depression, specifically to morning aggravation of the symptoms in association with the emotional valence of the dream, and may therefore

increase risk of suicide attempts in individuals with melancholic depression (Agargun et al., 2007). Moreover, suicidality was connected to shorter mean REM latency, a higher mean REM percentage and a decrease in dream-like quality of the REM content between the first and the second half of the night, which may signify disrupted mood regulation and affect incorporation into long-term memory networks while sleeping (Agargun & Cartwright, 2003).

Further sleep disruptions, for example obstructive sleep apnea-hypopnea syndrome (Wahner-Roedler et al., 2007) or symptoms of restless legs syndrome (Cuellar, Strumpf, & Ratcliffe, 2007), can emerge together with major depressive disorder. However, Carney and Moss (2014) warn against diagnostic confusion, which may occur due to inclusion of insomnia and hypersomnia among diagnostic criteria for depression. This may cause underrecognizing and undertreating sleep disorders, which may appear as a comorbidity, not as symptoms of depression, and needed treatment for them may not be provided.

Agitation

Changes in psychomotor activity are often associated with the diagnosis of depression. Whereas some individuals report agitation, which includes the incapacity to sit motionlessly, pacing, anxious behaviour expressing concerns, pulling and rubbing of skin, clothes and various other objects, others may experience retardation in thoughts, motion and speech, usually characterised by frequent delays in replying, lower volume of voice and intonation, poor quantity and diversity of topics or overall muteness. Nonetheless, these alternations must be visible to others, since simple report of these feelings by the depressed individual in insufficient for the diagnosis (American Psychiatric Association, 2013). Alda et al. (2004) mention further manifestations of agitation, for example tapping and stamping, and inhibition, for instance monotony, hypomimia, limited and slow gesticulation or even stupor. These psychomotor changes mainly appear in connection with conspicuous component of anxiety (Češková, 2001). Whilst agitation is addressed by the eleventh item of the questionnaire, psychomotor retardation or inhibition lacks its own item in the BDI-II. However, its physical components may be comprised in the item number fifteen, Loss of Energy or number twenty, Tiredness or Fatigue, while its psychological correlates may be involved in answers to the thirteenth item, Indecisiveness, or the nineteenth item, Concentration Difficulty, of the questionnaire.

It is arguable whether a type of major depressive disorder with psychomotor agitation, so-called agitated depression, should be considered a specific diagnostic entity in crucial disorder classifications. Agitated depression was found to be associated with lower age of onset, female gender, fast and excessive thinking, irritability, loquaciousness and tendency to risk than

depression without agitation. In addition, it was linked to atypical depressive symptoms and more frequent in individuals with the diagnosis of bipolar II disorder, four or more hypomanic symptoms (i.e. distractibility) or with family history of bipolar I or bipolar II disorder (Benazzi, 2004). Psychomotor retardation was connected to higher depression severity than depression with no such features, an earlier onset, longer duration of depression, more often episodes, higher frequency of suicidal behaviour, psychiatric disorders in family anamnesis and more bipolar features (Calugi et al., 2011).

By contrast, although combined agitated and retarded major depressive states are more frequently bipolar than unipolar, agitated and retarded depression, both with or without signs of retardation or agitation, are connected to bipolarity with the same frequency, moreover, agitated depression without signs of retardation was linked to unipolarity more than to bipolarity (Angst, Gamma, Benazzi, Ajdacic, & Rössler, 2009).

Nevertheless, Leventhal, Pettit and Lewinsohn (2008) argued that agitated and agitated-retarded depression were specific phenotypic syndrom within the diagnosis of major depressive disorder. Whilst agitated depression was related to irritability, arousal, bodily grievances, instability of the episodes, low heredity and tendencies to anxiety and alcohol consumption, the latter was associated with higher seriousness, recurrence, vegetative symptoms, suicide thoughts, decreased abilities in relationships, endogeneity, instability of the episodes, medium heredity and tendencies to anxiety and bulimia.

Psychomotor and anhedonic symptoms are associted with dopaminergic system in the striatum and the ventrolateral prefrontal and orbitofrontal cortex (Tremblay et al., 2005) and decrease in psychomotor agitation, but not retardation, may be triggered by high-frequency repetitive transcranial magnetic stimulation (Hoeppner et al., 2010). Psychomotor retardation, on the other hand, bore relation to reduction in motor cortex activation during exertion and fatigue caused by deliberate elbow flexion contractions in depressed patients with psychomotor retardation as opposed to depressed patients without psychomotor retardation and healthy controls (Loo et al., 2008).

Loss of Energy and Tiredness or Fatigue

Reduction of energy, tiredness and ceaseless fatigue without physical strain appear very often among depressive symptoms and the individual with these symptoms perceives lowered efficacy and the need of augmented effort when executing previously easily manageable tasks, such as dressing (American Psychiatric Association, 2013), which engenders decreased activity (World Health Organization, 1993) and low occupational and educational performance. The

depressed individual has difficulties with completing an initiated or starting a new task (Češková, 2001). Loss of Energy and Tiredness or Fatigue are tested by the fifteenth and the twentieth item of the questionnaire.

Corfield, Martin and Nyholt (2016) nevertheless discovered that twins of depressed patients evinced higher risk of fatigue and twins of individuals perceiving fatigue showed increased risk of depression. They hence argued that a genetic non-causal relationship existed in depression and fatigue and their association may emerge mainly due to shared genetic factors. According to Hur, Burri and Spector (2012), depression, fatigue and insomnia share heredity, environmental factors are nonetheless responsible of etiological distinction among them.

Amelioration of depressive symptoms is not always necessarily followed by decline of the level of fatigue. It has been suggested that the biological basis of tiredness, decrease of energy and fatigue may dwell in impairment of dopaminergic, noradrenergic and histaminergic neurotransmission (Demyttenaere, De Fruyt, & Stahl, 2005).

Indecisiveness and Concentration Difficulty

Difficulty thinking, concentrating and making decisions is reported by many patients with depression or observed by their relatives and acquaintances. They tend to yield to distraction, fail to perform previously manageable intellectually exacting duties in an appropriate way (American Psychiatric Association, 2013), which may be represented by an abrupt deterioration of grades in pupils and students (American Psychiatric Association, 2013; Fröjd et al., 2008), and express discontent about their memory, which may be misjudged as early signs of dementia, so-called “pseudodementia”, in the elderly. Nevertheless, in case of no diminution of the memory problems, a major depressive episode may be the initial manifestation of commencing dementia (American Psychiatric Association, 2013). An important decrease in function can also be detected in attention (World Health Organization, 1993) and intuition (Remmers, Topolinski, Dietrich, & Michalak, 2015), hesitancy (Češková, 2001) and forgetfulness (Wang & Gorenstein, 2014) may also be present. Indecisiveness and Concentration Difficulty are referred to by items thirteen and nineteen.

Decision-making difficulties were observed to differ not only quantitatively, but also qualitatively in depressed individuals and healthy controls. Whereas in the latter decisional conflict was driven mainly by their task-related concerns, individuals with depression dedicated their attention to processes of depression, for instance rumination, helplessness, lack of concentration or self-efficacy (Van Randenborgh, de Jong-Meyer, & Hüffmeier, 2009). In addition, Gadassi, Waser and Gati (2015) suggested that severity of depressive symptoms was

linked to deteriorated decision-making about one's career preferences in men. These cognitive impairments may disappear, but also persist with amelioration of mood-related symptoms (Trivedi & Greer, 2014).

Rayner, Jackson and Wilson (2016) argued that depressive symptoms were connected to the autobiographic memory network, consisting of the orbitomesial prefrontal cortex, dorsomesial prefrontal cortex, rostral anterior cingulate cortex, hippocampal formation, posterior cingulate and retrospenial cortex, the precuneus and parietal regions, and the cognitive control network, including dorsolateral prefrontal cortex, dorsal anterior cingulate cortex and auxiliary regions in mesial temporal lobe and intraparietal sulcus. Whilst poor engagement of the autobiographic memory network was associated with pathological pensivity, rumination and guilty feelings, decreased activity in the cognitive control network signified decision-making difficulties, automatic thoughts of negative emotional valence and problems with concentration and cognitive processing.

1.3.2 Cognitive symptoms

Sadness

Sadness is probably the most noticeable symptom of depression, since both the DSM and the ICD consider it one of the crucial symptoms used for the diagnosis. A patient describes their mood as depressed, sad, discouraged or "down in the dumps" and even if they do not report these feelings, they tend to admit it during an interview and it may be observed according to their facial expressions. Alternatively, one may express complaints about not having any feelings, feeling anxious or having bodily pains, such as headaches, joint pains or abdominal pains, instead (American Psychiatric Association, 2013). Sadness is addressed by the first item of the BDI-II.

The depressed mood does not change in the course of days and does not correspond to circumstances. Nonetheless, it can vary during the day, typically being worse in the morning. Individuals evince differences and certain atypical behaviour may emerge, as well as irritability, excessive alcohol consumption or histrionic behaviour. In some cases, other symptoms, such as anxiety, uneasiness or motor agitation, may prevail (World Health Organization, 1993).

Especially after the release of the DSM-5, which removed the aforementioned exclusion criteria for depressive symptoms after a significant loss, as listed in the DSM-IV, the question of differentiation between ordinary sadness and clinical depression became germane to current research of the topic. Whereas normal sadness is defined as a time-framed response to loss, depression is conceptualised as a long-lasting disturbing disorder, which can be transformed

from non-pathological sadness by avoidance behaviour trying to evade further losses, but preventing the acquisition of positive reinforcers (Leventhal, 2008). Bondolfi, Mazzola and Arciero (2015) suggest that clinical judgment should not yield to operational criteria and should consider individual experience, the affective context and personal story. In addition, Dura-Vila, Littlewood and Leavey (2013) pointed out that the context of sadness represented by an identifiable cause is the main aspect for conceptualisation of the symptoms as normal or abnormal.

Confidence judgments when recognising emotional states in their counterparts, emotion regulation strategies and time perception may also be altered in depressed patients while experiencing negative emotions. The BDI scores correlate negatively with confidence judgments when recognising sadness, anger, surprise and neutral expressions, which may lead to misinterpretation of the facial expression and thus to insecurity and social withdrawal (Fieker, Moritz, Köther, & Jelinek, 2016). This fact can be connected to concentration and decision-making difficulties, which persist in a patient even in remission (Nierenberg et al., 2010).

Emotion regulation, which determines the offset of emotional responding and thus the diversion of the free flow of emotions (Koole, 2009), tends to be dysregulated in major depressive disorder (Beauregard, Paquette, & Levesque, 2006). Suppression of emotions belongs among emotion regulation strategies typically used in mood disorders. Patients suppress their emotions and consider them less acceptable than healthy controls and a high level of suppression is connected to increased negative emotion during and after the exposure to an emotional stimulus (Campbell-Sills, Barlow, Brown, & Hofmann, 2006).

Gil and Droit-Volet (2009) suggested that time perception may also be altered according to the level of sadness experienced in depression, since higher scores as assessed by the Brief Mood Instrospection Scale (BMIS; Mayer & Gaschke, 1988) were associated with considering a time period given during the experiment shorter than it actually was as opposed to healthy controls.

Pessimism

Sad and pessimistic perspective on the future is another crucial symptom of depression (World Health Organization, 1993) together with feelings of despair, futility and hopelessness, when life is experienced as a combination of shades of black and grey (Češková, 2001). The respondent of the BDI-II indicates their level of pessimism in the second item of the questionnaire.

This negative outlook can be theoretically represented as the cognitive triad, which comprises the patient‘s negative views of themselves, their experiences and their future. Whereas underestimating and low self-esteem is related especially to self-dislike and self-criticalness, which will be mentioned later, the latter are connected to pessimistic attitudes of the depressed individual. The patient tends to understand circumstances in a negative way, regards the world as excessively demanding and interprets their experiences as inauspicious even when a more probable explanation is available. Moreover, they anticipate difficulties and their future symbolises interminable affliction full of failures (Beck, Shaw, Rush, & Emery, 1979) as well as lack of positive outcomes (Miranda & Mennin, 2007).

Negative outlook was observed in 78% of depressed patients as opposed to 22% of healthy controls. It is typically associated with anticipation of negative consequences and unsuccessful outcomes, therefore this cognitive pattern might interfere with the patient’s willingness to undergo both therapeutical and medical treatment (Beck, 1967).

When depressed patients anticipate an event, brain activation within the medial and dorsolateral prefrontal areas, inferior frontal gyrus and medial thalamus is similar to brain activation while expecting a negative, but not positive or emotionally neutral event, although the emotional valence is not yet known. In addition, activation within the medial and dorsolateral prefrontal areas and inferior frontal gyrus correlated with depression severity as measured by the BDI, Hamilton Depression Scale (HRSD; Hamilton, 1960) and Montgomery-Åsberg Depression Rating Scale (MADRS; Montgomery & Asberg, 1979). This activation significantly differed from brain activation in healthy controls (Herwig et al., 2010). By contrast, the level of pessimism can contribute to the risk of depression as studied with public sector employees (Karlsson et al., 2011) caregivers of patients with Parkinson’s disease (Lyons, Stewart, Archbold, Carter, & Perrin, 2004) and female cancer patients (Zenger, Glaesmer, Höckel, & Hinz, 2011) and influence the quality and quantity of homework produced within the course of cognitive behavior therapy (Sachsenweger, Fletcher, & Clarke, 2015). Furthermore, pessimism aggravates depressive symptoms connected to familial criticism (Hirsch, Walker, Wilkinson, & Lyness, 2014) and less pessimism was associated to greater religious and existencial well-being and less depressive symptoms (Hirsch, Nsamenang, Chang, & Kaslow, 2014).

Worthlessness, Guilty Feelings, Past Failure and Punishment Feelings

A depressed individual tends to lose confidence and to gain remorse (Češková, 2001), to ruminate over and feel guilty about past failures, even those with a minor significance, to

have an exaggeratedly pessimistic judgment about their worth and to construe ordinary life situations as manifestations of their own faults. They feel exceedingly responsible for negative circumstances, even though they could not induce them. These feelings may reach, in serious cases, proportions of delusions connected to worldwide topics. They can be also present as blaming themselves for being depressed and not achieving preset goals in one's professional or personal life, which is nonetheless insufficient to be regarded as pathological on its own, since these are often prevalent among patients (American Psychiatric Association, 2013).

Feelings of guilt and worthlessness appear even in mild depression cases (World Health Organization, 1993). These feelings of guilt and tendencies to self-blame are closely linked to a conviction that one deserves a strict punishment, should be judged and condemned (Křivohlavý, 2013). Worthlessness, guilty feelings, punishment feelings, and past failures are referred to by the fourteenth, the fifth, the sixth and the third item of the questionnaire, respectively.

The connection between failure and depression was found to be twofold in young females: childhood depressive symptoms were connected to failures in educational environment during adolescence, which was associated with depression during adulthood. However, no connection was found among male participants of the study (McCarty et al., 2008). Worthlessness was observed to be a crucial predictor for postremission suicide attempts after a single major depressive episode (Wakefield & Schmitz, 2016).

Kim, Thibodeau and Jorgensen (2011) nevertheless argued that the concept of guilt, which judges only specific behaviour, and the concept of shame, which comprises the whole personal identity, should be distinguished. Thus defined, shame was associated with depressive symptoms. Only two particular types of pathological guilt, on the other hand, were also connected to depression: contextual-maladaptive guilt, linked to the fact that an individual feels responsible for events, which they could not influence, and generalised guilt, accounting for a perceived feeling of guilt not associated with any specific situation or event. O'Connor, Berry, Weiss and Gilbert (2002) further distinguished survivor guilt, felt when an individual perceived their situation as more favourable than the one of others, and omnipotent responsibility guilt, related to an excessive feeling of responsibility for others' happiness, which both correlated with depression. Pathological guilt was observed to be linked to depression in cancer patients (Alavi, Amin, & Savoji, 2013) and both shame and maladaptive guilt were found to be salient for childhood depression in preschoolers (Luby et al., 2009).

Regarding punishment feelings, positive correlation was found between sensitivity to punishment and shame in both patients with major depressive disorder and healthy controls and

depression was related to shame proneness (Guimón, Las Hayas, Guillén, Boyra, & González-Pinto, 2007).

Self-Dislike and Self-Criticalness

Low confidence and self-assurance belong to other common symptoms of depression (World Health Organization, 1993). Self-dislike and self-criticalness are also linked to the depressed individual's negative view of themselves, which constitutes one of the three components of the aforementioned cognitive triad. According to Beck, Shaw et al. (1979), the person "sees himself as defective, inadequate, diseased, or deprived. He tends to attribute his unpleasant experiences to a psychological, moral, or physical defect in himself. In his view, the patient believes that because of his presumed defects he is undesirable or worthless. He tends to underestimate or criticize himself because of them. Finally, he believes he lacks the attributes he considers essential to attain happiness and contentment." In the BDI-II, the seventh and the eighth items, self-dislike and self-criticalness, correspond to these symptoms.

Self-criticism was found to be linked to anger, both in terms of state and trait, reduced control of anger and directing anger towards both the self and others in adults (Abi-Habib & Luyten, 2013) and mothers with postpartum depression (Vliegen & Luyten, 2008). Therefore, it may be concluded that self-criticism tends to be connected to angry and hostile characteristics of depression. Moreover, focusing on anger perceived towards the self and low anger control correlated with levels of depression, which may be caused by further self-criticism triggered by these features (Abi-Habib & Luyten, 2013).

Anger directed towards others is, on the other hand, related to vulnerability to depressive symptoms (Abi-Habib & Luyten, 2013), which are, following fluctuations in daily hassles and stress, associated with self-criticism (Adams, Abela, Auerbach, & Skitch, 2009; Kopala-Sibley, Zuroff, Hankin, & Abela, 2015) as well as low habitual self-compassion (Ehret, Joormann, & Berking, 2014). The connection between self-criticism and depression was stronger if immature dependence was present and self-criticism was also linked to past history of depression (Mongrain & Leather, 2006). Women with major depressive disorder showed higher levels of self-criticism than men (Luyten et al., 2007).

It was argued that only one of two components of self-criticism, comparative self-criticism, was related to depression in high school and university students (Öngen, 2006). Whereas comparative self-criticism signifies unsatisfactory comparison of the self with others and the individual perceives themselves as inferior and constantly criticised and hence prefers not to be appraised by others, the second component of self-criticism, internalized self-

criticism, comprises unfavourable comparison of the self with internal, personal and often continually increased standards, which are thus hardly attainable (Thompson & Zuroff, 2004).

The association between self-criticism and depression may be strenghtened by additional fear of compassion, in other words the inability to perceive and accept care, support and kindness from others. Self-critics tend to evince augmented negative affect and their threat system is often constantly activated due to intimidating early experience and inner hostility, which leads to self-protective interpersonal behaviour. This behaviour may engender decreased reception of support and safety from others, reduced social safeness and under-activation of soothing system. Overall, this mechanism contributes to vulnerability to depression (Hermanto et al., 2016).

Suicidal Thoughts and Wishes

Major depressive disorder is in general linked to high mortality, a large proportion of which is associated with suicide. Depression is often accompanied by thoughts of death, suicidal ideation and suicide attempts. Such thinking may be represented by a desire not to awaken on the next day, a conviction that one's death would be favourable to others, temporary but repetitive ideas about suicide or concrete intentions to commit suicide. Its occurrence may vary from one- to two-minute slots once or twice a week to more frequent, concentrated and fatal thoughts. In serious cases a depressed individual tends to organise their affairs, gather lethal material and plan when, where and how to commit suicide. This behaviour was found to be linked with suicide attempts and to be useful in evaluation of suicide risk of a certain individual, even though it must be kept in mind that such predictions are not completely accurate. Motives for accomplishing suicide may embrace a wish to surrender face to face with insuperable obstacles or to terminate a seemingly endless, unbearable and grievous emotional state, an incapability to expect any kind of pleasure in the future and a perception of oneself as a burden to others. Surmounting of such thoughts may be crucial in reduction of suicide risk (American Psychiatric Association, 2013). World Health Organization (1993) does not distinguish between suicidal attempts, most commonly intentional poisoning by prescribed medicine, and parasuicide, since both these features are included in the term of "self-harm" and are classified under additional codes. Suicidal thoughts and wishes create the ninth item of the questionnaire.

Increased suicide risk may be observed in individuals with additional psychotic features, completed suicides in family anamnesis, current substance use or past history of suicide attempts (American Psychiatric Association, 2000), in spite of the fact that most completed

suicides do not follow an unfinished attempt. Among other characteristics increasing risk of suicide belong male gender, being single, living alone, being diagnosed with borderline personality disorder, evincing high levels of hopelessness (American Psychiatric Association, 2013) or worthlessness (Wakefield & Schmitz, 2016). The risk for suicide attempt is increased for women, whereas the risk for its completion is higher for men, although the disproportion is lower among depressed individuals than in general population (American Psychiatric Association, 2013).

It is presumed that 5-15% of individuals with depression end their life when committing suicide and a half attempts to commit it (Raboch & Laňková, 2008), whilst 10-25% of suicides committed in the Czech Republic may be attributed to major affective disorder, although some estimations presuppose that as much as 70-80% of suicides may be a consequence of a certain affective disorder. About 40% of suicide attempters were diagnosed with a psychiatric disorder (Alda et al., 2004). Serious cases often lack motivation and energy for impulsive and aggressive behaviour and only with amelioration of symptoms the individual acquires energy to execute their suicidal plan. This behaviour is often precended by several phases, including suicidal fantasies, concrete ideas, self-defense against them or call for help, often not recognised by their family and friends. With a crystallizing decision the patient becomes paradoxically calmer (Češková, 2001).

It was discovered that depressed individuals tended to reveal a greater future suicide intend as well as permissive attitude towards suicide, which comprised a notion of suicide as free from life suffering, a personal right and a solution to a hard life situation. They thus differed from non-depressed participants (Jeon, Park, & Shim, 2013).

Suicidal ideation was found to be linked to cognitive inflexibility and executive dysfunctions, especially with deficits in decision-making (Westheide et al., 2008) and attention (Keilp, Gorlyn, Oquendo, Burke, & Mann, 2008). Depressive symptoms, suicidal ideation and attempts were connected to restrictive emotionality, referring to the problems with and concerns about expressing one's feelings (Jacobson, Marrocco, Kleinman, & Gould, 2011). Suicidal behaviour, rather than suicidal thoughts alone, revealed an association to insomnia (Kay et al., 2016).

Bogers, Zuidersma, Boshuisen, Comijs and Voshaar (2013) argued that it was essential to distinguish between thoughts of death and suicidal ideation in depressed elderly individuals, because their risks and impacts on lives of the individuals may differ despite their close connection. Whereas thoughts of death with no suicidal ideation were linked to older age, suicidal ideation correlated with comorbidity in terms of dysthymia, alcohol consumption,

panic disoder both with and without agoraphobia and past suicide attempts, as well as other attributes, for example higher education, lonesomeness and past events. In disadvantaged mothers, depression and thoughts of death significantly correlated with intrafamilial violence and alcohol consumption and the combination of these three features augmented the risk of hospitalisation of the child (Crandall, Sridharan, & Schermer, 2010).

Suicidal behaviour is connected to increased activity of the components of stress-related responses, the HPA axis and of the noradrenergic system, and to disturbed functioning of serotonergic system, anxiety, impulsivity and agression regulation (Van Heeringen, 2003). Furthermore, suicidal thoughts and attempts correlate with low levels of total cholesterol, low density lipoprotein cholesterol, total lipids and triglycerides in depressed patients (Ainiyet & Rybakowski, 2014). Concerning late-onset depression, the history of suicide attempts was linked to reduction of both grey and white matter volume in the frontal, parietal and temporal regions and the insula, the lentiform nucleus, the midbrain and the cerebellum and to a regional decrease in dorsal medial profrontal cortex (Hwang et al., 2010).

1.4 Biological Features

Research of neuroanatomical, neuroendocrinological, and neurophysiological correlates of major depressive disorder revealed the association of HPA axis hyperactivity with melancholia, psychotic features, and risks for eventual suicide. Functional abnormatilies in specific neural systems connected to emotion processing, reward seeking and emotion regulation in depression were also found. Genetic variants in neurotrophic factors and pro-inflammatory cytokines also appeared on a molecular level. However, research of depression still lacks a diagnostic tool with sufficient sensitivity and specificity (American Psychiatric Association, 2013).

The main structures involved in the pathophysiology of depression are prefrontal cortex, thalamus, basal ganglia, the complex of amygdala and hippocampus and connections among these structures. Whereas overall atrophy is not found, increased amount of white matter and higher periventricular density are present. In unipolar depression, frontal lobe, cerebellum, caudatum, putamen and hippocampus may evince a smaller size and left anterolateral prefrontal cortex evinces reduction in glucose metabolism, which correlates with depression severity. The reason for brain atrophy in aforementioned regions may be reduction of brain derived neurotropic factor caused by prolonged stress. However, in evaluation of the activity of these structures, age of the individual as well as potential vascular difficulties must be taken into account. Higher prevalence of depression was also observed after myocardial infarction,

possibly due to temporary hypoxia (Alda et al., 2004). The duration of depression was also linked to hippocampal volume reduction and antidepressants were found to act neuroprotectivelly in this matter (Sheline, Gado, & Kraemer, 2003). In addition, subcallosal cingulate is activated when sadness is experienced (Phan, Wager, Taylor, & Liberzon, 2002) and unipolar depression is characterised by reduced evoked potentials in reaction to increased intensity of light stimulus as opposed to bipolar depression, evincing an augmentation in average evoked response amplitude (Buchsbaum, Goodwin, Murphy, & Borge, 1971).

Neurophysiological work refers to depression as a consequence of reversible functional imbalance of diencephalic mechanisms of reinforcement, excessive state of vigilance supported by intraneuronal accumulation of sodium and a correlate of catecholaminergic deficiency. Vegetative nervous system and especially hypothalamus are responsible for somatic manifestations of emotion in general, such as pulse frequency, blood pressure changes or perspiration (Alda et al., 2004).

According to monoamine hypothesis of mood disorders, depression is connected to functional insufficiency of catecholamines (adrenaline, noradrenaline and dopamine) and reduction of serotonin. Bodies of monoaminergic cells can be found in the brainstem, namely in raphe nuclei and locus coeruleus. Higher levels of metabolites of noradrenaline and decreased levels of the main metabolite of serotonin may be observed in urine, plasma and cerebrospinal fluid. Moreover, patients with depression tend to have lower levels of tryptophan and serotonin uptake and increased serotonin binding on blood platelets (Češková, 2001). Some responses to challenge tests, such as blunted growth hormone or prolactin, may also be disrupted (American Psychiatric Association, 2000).

In addition, patients with depression have lower levels of gamma-aminobutyric acid (GABA) (Petty, Padala, & Punia, 2003), four times higher number of corticotropin-releasing hormone neurons in the hypothalamic paraventricular nucleus and three times higher number of corticotropin-releasing hormone neurons co-expressing vasopressin, which are hypothesized to be connected to the activation of the HPA axis (Raadsheer, Hoogendijk, Stam, Tilders, & Swaab, 2004). Adrenocorticoid hypersecretion, augmented pituitary and adrenal gland and increased cerebrospinal fluid corticotropin-releasing factor concentrations were also observed in patients with depression (Musselman & Nemeroff, 1996).

Altered immunity has not been proven to be a specific symptom of depression, but may emerge in certain groups of patients (Alda et al., 2004). Reaction of lymphocytes to mitogens may be disrupted and levels of circulating immunoglobulins and lymphocytes may be reduced (Češková, 2001). Leonard (2009) points out that stress and depression cause hypoactivity of the

glucocorticoid receptors in limbic system and on immune cells, which is linked with cellular immunity, higher activity of the HPA axis and increased secretion of proinflammatory cytokines.

Antinuclear factor was found positive in 30-40% of patients with depression, which is otherwise typical for autoimmune diseases (Alda et al., 2004). Depressed patients are four times more often diagnosed with hypothyroidism or autoimmune thyroiditis (Gold, Pottash, & Extein, 1982). They were found to evince alterations in thyroid-stimulating hormone response to thyrotropin-releasing hormone and increased level of antithyroid antibodies as well as cerebrospinal fluid thyrotropin-releasing hormone concentrations (Musselman & Nemeroff, 1996) and hypercortisolemia (Češková, 2001).

Kindling hypothesis suggests that intermittent subliminal electric and chemical stimuli in limbic system lead to growing neural depolarisation, causing an independent stable focus of seizures with possible behavioural consequences similar to recurrent affective disorder. Reaction to repetitive stimuli ascends to the point that the presence of stimulus is not necessary and the disorder continues. External stress may thus activate early episodes of the disorder, whereas subsequent ones do not require precipitating factors (Češková, 2001).

1.5 Development and Differential Diagnosis

In the United States, a twelve-month prevalence of major depressive disorder of 7% was reported with a threefold higher rate in individuals between eighteen- and twenty-nine-year-olds than sixty-year-old and older individuals as well as 1.5- to threefold higher rate in women than men in terms of major depressive disorder beginning during adolescence (American Psychiatric Association, 2013). Life prevalence was found to be 16.2% (Kupfer, Frank, & Phillips, 2012) and about 350 000 000 people in the world are estimated to be affected (World Health Organization, 2016). A fifth of patients in treatment do not reach remission in the first two years after pharmacological treatment initiation (Rush et al., 2006). European Health Interview Survey in the Czech Republic EHIS 2008 revealed a twelve-month prevalence of 3.9% in the Czech Republic, when 5.4% of women and 2.2% of men reported suffering from depression (Daňková, 2011).

Nevertheless, course or treatment response does not differ between genders or among age groups, although symptom differences appear. Hypersomnia, hyperphagia and suicide attempts are more common in younger individuals, whereas psychomotor disturbances are typical for older age groups (American Psychiatric Association, 2013). Overall, prevalence of

depression increases and is detected in younger age, especially in the USA, Sweden, New Zealand and Canada (Alda et al., 2004).

Neuroticism and stressful events in the past of the individual, not necessarily close to the onset of the disorder, were found to be associated with the risk of development of depressive disorder. Heritability accounts approximately for 40%, first-degree family members are therefore two- to fourfold more likely to develop the disorder than general population (American Psychiatric Association, 2013) in both families with history of unipolar and bipolar disorder. Concordance for depression is 40-50% for monozygotic and 15-20% for dizygotic twins. Cyclothymic, dysthymic and melancholic personalities as well as people with traits of rigidity, obsessivity, restraint, dominance or contemplative nature are predisposed to develop depression (Alda et al., 2004).

The incidence of depression onset reaches its peak between the 20th and the 30th year of age, but is not uncommon in any period of life. Remission, a period of two or more months with no symptoms or only one or two symptoms of mild severity, is experienced by some only rarely or never, whilst number of patients tend to report no or few symptoms of a mild degree during the course of many years. It is therefore necessary to differentiate a patient seeking for a therapy due to aggravated symptoms from those with a newly-developed disorder. Duration of periods with no remission is linked to probability of underlying personality, anxiety and substance use disorders, hence it is useful to detect their presence. Psychotic and anxious features, personality disorders, symptom severity and the length of the current episode are also determinants of lower recovery rates. Under ordinary conditions, recovery usually appears within three months for two in five depressed individuals and for four in five within a year. The risk of recurrence increases with shorter duration of remission, severity and number of previous episodes, and younger age. The overall impairment may range from very mild, unrecognizable even during a close interaction, to severe incapability of fulfilling needs, muteness or catatonic state (American Psychiatric Association, 2013). Although it is possible to experience only one episode of depression in life, the risk of recurrence is high, approximately 50% after the first episode and 90% after the fourth (Češková, 2001).

Special care must be given in case of the evaluation of depressive symptoms in patients with general health condition or comorbidity, such as cancer, stroke, myocardial infarction, diabetes or pregnancy, since some of the symptoms, for example weight loss or fatigue, may appear as signs of this condition, rather than signs of depression. Unless these symptoms are closely related to the somatic condition, they may be considered symptoms of a major depressive disorder. Particular attention must be then paid to nonvegetative symptoms, such as

guilty feelings, worthlessness, impaired decision-making or suicidal thoughts (American Psychiatric Association, 2013). Certain pharmaceuticals, such as antihypertensives, corticosteroids or hormones (for example contraceptives) are also associated with depression (Češková, 2001).

Although an individual may appear to have a major depressive disorder after one or more depressive episodes, a bipolar disorder may be later diagnosed. This is particularly common in individuals with bipolar disorders in family anamnesis, younger age during the onset or psychotic or "mixed" features. Major depressive disorder, especially when psychotic features are present, can also develop into schizophrenia. Mental disorders as well as chronic and disabling medical conditions also increase the risk of depression. In general, during diagnosing with depression, the clinician must evaluate a possible presence of manic symptoms, specific medical condition which may pathophysiologically induce depressive symptoms and recent substance abuse, and all the criteria for major depressive disorder must be met (American Psychiatric Association, 2013). Differential diagnostics of depression and schizophrenia is mainly conducted via differentiation of symptoms and delusions. Another diagnosis to consider may be depressive affect accompanying borderline personality disorder (Češková, 2001).

2 Beck Depression Inventory

2.1 Assessment of Depression

Current practices in depression assessment tend to lean towards a strategy of combination of multiple methods and their utilisation is based on diagnostic criteria, knowledge of risk factors and effective clinical decision-making. Monitoring of ongoing progress during intervention is also crucial to address the patient's newly-emerged needs. In general, the right method must be chosen according to the patient, course of disorder and experience of the examiner, since different strategies require different level of skills (Hopko et al., 2004). Thorpe and Olson (1997) classify these strategies as unstructured or structured interviews, self-report measures, observational methods, and functional analysis.

2.1.1 Interviews

Conducting interviews, which may vary from strict, goal-directed structured ones through semi-structured, which still evince a degree of flexibility, to unstructured, highly adaptable interviews, requires moderate skills of the examiner. This level of flexibility contributes to the assessment by involving the relationship between the patient and the examiner and possibility of detailed analysis of the patient's answers as well as their history into the process. On the contrary, a higher level of structure is characterised by an increased reliability, validity, straightforwardness and simplicity. Rating and evaluation of the patient's state are also dependent on the clinician's experience and knowledge (Hopko et al., 2004).

The Structured Clinical Interview for DSM-5 (SCID-5; First, Williams, Karg, & Spitzer, 2016) and for DSM-IV – Patient Version (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1996) are semi-structured interviews based on diagnostic criteria listed in the DSM-5 and the DSM-IV, respectively. The system of these interviews is categorical and offers an algorithm, which results in final diagnosis. The clinician or other mental health professional must be familiar with the classification of the given manual and highly trained to assign this 60-to-90-minute-long administration, which begins with an unstructured interview and leads to a structured series of questions (Hopko et al., 2004). The interview has a variety of applications, from clinical intake procedures through comprehensive forensic diagnostic evaluation, systematical evaluation of the DSM diagnoses, selection and classification of a study population in research, evaluation of prevalence and incidence in policy-making or practicing of interview-conducting among students of mental health professions. The newest DSM-5 form is available in clinician, personality disorders, research and clinical trials versions (American Psychiatric Association, 2016). Although studies of this instrument demonstrated satisfactory

inter-rater reliability and diagnostic accuracy (Ventura, Liberman, Green, Shaner, & Mintz, 1998) and has been widely used in studies of treatment outcome, it might be advisable to use a less time-demanding method or to use only the mood disorder module in case of suspected depression (Hopko et al., 2004).

The results of about two-hour-long Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978), derived from questions on current and past functioning, contribute to evaluation of duration and severity of 20 disorders, including major depression and other affective disorders. Similarly to the SCID, it requires an extensive training of the examiner. Despite its high time demands it evinced excellent reliability for depressive disorders (Spitzer, Endicott, & Robins, 1978).

The severity of depressive symptoms and changes in the patient's functioning may also be measured by the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960). This interview takes only about 10 minutes, some authors nevertheless report 30 to 60 minutes (Filip, Sikora, Maršálek, Jirák, & Paclt, 1997) and it is recommended to dedicate approximately 30 minutes to a clinical interview evaluating the symptoms according to the diagnostic criteria (Hamilton, 1967). The HRDS has excellent interrater reliability and moderate convergent validity with some of the most widely used self-report measures of depression (Nezu et al., 2000) and Kobak and Reynolds (1999) report that it became the standard outcome measure in clinical trials.

Clinical interview, beginning by questions on the presence of depressive symptoms and detecting their intensity later, may also follow the 10-item Montgomery and Åsberg Depression Rating Scale (Montgomery & Åsberg, 1979), reflecting changes during the course of treatment and evaluated by the psychiatrist or psychologist taking care of the patient. Similar evaluation takes approximately 15 minutes and it is focused on an arbitrary interval between two evaluations, most frequently one week (Filip et al., 1997).

Jouvent, Frechette, Binoux, Lancrenon, and des Lauriers (1980) developed A Depressive Retardation Rating Scale, sometimes referred to as Salpêtrière Retardation Rating Scale (SRRS), which reflects the patient's behaviour in 15 items. Both verbal and nonverbal behaviour may nevertheless be evaluated only during the approximately 20-minute-long examination (Filip et al., 1997).

Depression may also be detected by certain scales of The Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962), which measure somatic concern, anxiety, emotional withdrawal, guilt, depressed mood, motor retardation or blunted affect, although the overall tool is focused on assessment of 18 psychiatric symptoms and their change over time. The

results of this measure are based on a 20-30 minutes long clinical interview. Faustman and Overall (1999) reported satisfying interrater reliability as well as discriminative and predictive validity.

Another 90-to-120-minute-long interview for prevalence and incidence of psychiatric disorders estimation, the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan, & Ratcliff, 1981), was constructed to be used by trained laypeople at the National Institute of Mental Health. Although adequate reliability and accuracy were reported, instruments with properly investigated psychometric properties and lower time demands may be preferred in a clinical context (Nezu et al., 2000).

As a result of a considerable overlap with various other diagnoses, depression detection may also appear as a side-product of assessment methods, primarily focused on different disorders. The Anxiety Disorders Interview Schedule (ADIS-IV; Brown, DiNardo, & Barlow, 1994), which includes a comprehensive module for major depression, may serve as an example.

2.1.2 Self-Report Measures

Almost 80 self-report measures, which are available at present, provide a wide range of possible applications. They are useful in screening for a potential disorder, as additional measures in the diagnostic process, controlling the patient's development in psychotherapy and psychopharmacology, as well as evaluating efficacy and effectiveness of treatment. Their versatility may be observed thanks to various symptom areas they assess, including emotional, cognitive, somatic or behavioural (Nezu et al., 2000). Some of the most widely spread ones are presented in this chapter. Later, more attention will be dedicated to the Beck Depression Inventory, which also belongs to this category.

Zung's Self-Rating Depression Scale (SDS; Zung, 1965) is an effective measure of changes during the course of therapy. Twenty items are classified into boxes signifying frequencies of given symptoms and it is recommended that the examiner is present during the classification. The examination takes approximately 20 minutes and reflects the last week (Filip et al., 1997).

Reynolds and Kobak (1995) published the professional manual for the Hamilton Depression Inventory (HDI), which assesses the presence and severity of depressive symptoms in both a 23-item and a 17-item version, the latter being consistent with the HRSD in terms of content and scoring. This measure has been found to evince sound psychometric properties, such as internal consistency, test-retest reliability and convergent validity with both the HRSD and the BDI. These authors also designed the Reynolds Depression Screening Inventory (RDSI;

Reynolds & Kobak, 1998), a 19-item measure assessing depressive symptoms according to the DSM-IV criteria, whose results are strongly associated to results of the HRSD and the BDI and evinces sound internal consistency, test-retest reliability, sensitivity and specificity.

Although the Center for Epidemiological Studies' Depression Scale (CES-D; Radloff, 1977) was originally designed for epidemiological research, its adequate psychometric properties (Nezu et al., 2000) and relation of its results to the diagnosis of depression (Myers & Weissman, 1980) made this 20-item tool a possible alternative for initial screening (Roberts & Vernon, 1983).

Sound psychometric properties, including internal consistency and sensitivity, were also observed in the Harvard Department of Psychiatry/National Depression Screening Day Scale (HANDS; Baer et al., 2000), a measure consisting of 10 items derived from other instruments, such as the BDI or the Zung SDS.

Further possibility of measuring depression is testing via subscales of thorough tests of psychopathology. One of them is the Minnesota Multiphasic Personality Inventory 2 Depression Scale (MMPI-2-D; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), which was created to test state depressive symptoms. Depression scale is one of the 10 clinical scales of the measure. In addition, extra information about the patient may be acquired thanks to Harris-Lingoes Depression Subscales, which investigate subjective depression, psychomotor retardation, physical functioning, apathy and thoughtfulness. The main drawbacks of the method is not only a large number of items, but also its potential bidimensionality (Chang, 1996).

Another such tool is the Personality Assessment Inventory (PAI; Morey, 1999), a 344-item measure of psychopathology, which involves, among other scales, a depression scale, embracing a cognitive, affective and physiological subscale. The results of the scale correlate with the BDI, the HRSD and the MMPI-D.

Regarding other self-report measures assessing for depression, the Symptom Check List (SCL-90-R; Derogatis & Unger, 2010), the Patient Health Questionnaire (PRIME-MD; Spitzer, Kroenke, & Williams, 1999), the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D; Zigmond & Snaith, 1983) or the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995) with their depression subscales may serve as other examples of widely used tools. Furthermore, certain measures were designed for specific populations, such as the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) for mothers in postpartum period or the Geriatric Depression Scale (GDS; Yesavage et al., 1982) for the elderly.

2.1.3 Observational Methods

Rehm (1988) suggested that observation during the assessment of depression should focus on overt-motor behaviour, such as irritability, agitation, crying, suicidal wishes and attempts, lack of eye contact, psychomotor retardation, reduced activity, changes in sleep pattern, appetite and loss of sexual interest.

In addition to the differences between depressed and nondepressed individuals, which were mention earlier, in the chapter 1.3 – Symptoms of Depression, this differences may appear at the level of speech (Alpert, Pouget, & Silva, 2001), facial expressions to positive stimuli (Reed, Sayette, & Cohn, 2007), eye contact (Hinchliffe, Lancashire, & Roberts, 1970), head pose and movements (Alghowinem, Goecke, Wagner, Parker, & Breakspear, 2013), overall competence in social skills (Segrin, 2000) and other areas. Nonetheless, observation of these differences may only contribute to a comprehensive depression assessment as an auxiliary qualitative measure (Hopko et al., 2004).

More practical and systematic tools should complete such an assessment. One of them is the Pleasant Events Schedule (PES; MacPhillamy & Lewinsohn, 1982), which monitors and tests positive activities of a depressed patient as well as measures a treatment outcome and a subsequent change in symptoms. Lejuez, Hopko, LePage, Hopko and McNeil (2001) also developed daily diaries, which reflect the frequency and duration of healthy activities not connected to depression in depressed patients, serve as a measure of treatment outcome and help to plan further steps in treatment.

2.1.4 Functional Analysis

Generally speaking, functional analysis consists in identifying relevant and causal environmental factors, which are able to be monitored and are associated with enduring of depressive symptoms. In this context, functional analysis should precede behavioural intervention (Hopko et al., 2004).

O'Neill, Horner, Albin, Storey and Sprague (1990) reported that in depression operational definition of unhealthy behaviour, such as substance abuse, suicidal thoughts and wishes, apathy, social withdrawal or crying, is made by several methods of information acquisition, for example interviews with the patient, his friends and family, observation or manipulation of treatment situation.

Other techniques, such as daily reports of depressive behaviour, their time, place and situational context and consequences, are also used (Hopko et al., 2004) and some of them may help in tracking maladaptive thought processes (Beck, Shaw et al., 1979).

2.2 History and Editions of the Beck Depression Inventory

The original version of the BDI (Beck et al., 1961) was composed as 21 items representing symptoms typically connected to difficulties experienced by patients diagnosed with depression, but were uncommon in other psychiatric patients. These items were not selected according to a certain depression theory, but specifically on verbal descriptions of patients' difficulties. Among these items, Mood, Pessimism, Sense of Failure, Lack of Satisfaction, Guilty Feeling, Sense of Punishment, Self-Hate, Self Accusations, Self Punitive Wishes, Crying Spells, Irritability, Social Withdrawal, Indecisiveness, Body Image, Work Inhibition, Sleep Disturbance, Fatigability, Loss of Appetite, Weight Loss, Somatic Preoccupation and Loss of Libido could be find. The original sample for the BDI consisted of 226 hospitalised and ambulatory psychiatric patients. Patients with organic brain injuries as well as with below-average intelligence were excluded.

This version was already based on a 4-point scale reflecting the severity of the symptom. The administration was conducted by a trained interviewer, who was reading the content of the questionnaire aloud to the patient. The patient was then deciding between statements, which were fitting the most to their current state of mood. The administration and scoring took approximately 10 to 15 minutes (Beck, Steer, & Brown, 1996). If the respondent gained 0 to 9 points, they were classified as nondepressed, 10 to 15 points signified mild depression, 16 to 23 points moderate depression and more than 24 points severe depression (Preiss & Vacíř, 1999).

Before the BDI-II was published, the first version of this instrument, the BDI, has become the most widely accepted tool to measure the severity of depression in both patients and ordinary population (Piotrowski & Keller, 1992). Beck, Steer, and Carbin (1988) evaluated its internal consistency as a mean coefficient alpha of .86 for psychiatric patients and .81 for nonpsychiatric respondents, adequate concurrent validity with respect to clinical ratings and the HRSD and construct validity. Moreover, it was observed that the BDI was sound in discriminating subtypes of depression as well as depression from anxiety. Factor analyses suggested a general syndrome of depression including highly inter-correlated first-order dimensions of symptoms, whereas the number of factors as well as their composition was dependent on the nature of the sample studied. Among its drawbacks, Richter et al. (1998) mention lack of representative norms and thus doubtful interpretation of results, controversial factor validity and unstability of results in time.

The BDI was often used in both clinical settings and research, for example in patients after cerebral apoplexy (Preiss & Vacíř, 1999), posttraumatic stress disorder (Sipprelle, 1992)

or Huntington disease, where BDI measures also preserved introspection skills (Preiss & Vacíř, 1999). This instrument has so far been used in more than 7000 studies (Wang & Gorenstein, 2013b).

The second version of the BDI, the BDI-IA, which was supposed to address changes in diagnostic context over years (Arbisi, 2001) and overcome difficulties of the original, such as gender bias and insufficient differentiation of depression severity (Santor et al., 1994), replaced the original version in 1971. Beck and his colleagues at the Philadelphia Center for Cognitive Therapy of the University of Pennsylvania also obviated alternative names for some symptoms and removed double negatives. Optional responses were set to four alternatives in maximum and all the items, except for Crying, Irritability, Fatigability, Loss of Appetite, Weight Loss and Loss of Libido. The final versions were published in 1979 and 1987, most of the research papers from consequent years nevertheless still use the original version of the BDI. The items included in this version were Sadness, Pessimism, Sense of Failure, Self-Dissatisfaction, Guilt, Punishment, Self-Dislike, Self-Accusations, Suicidal Ideas, Crying, Irritability, Social Withdrawal, Indecisiveness, Body Image Change, Work Difficulty, Insomnia, Fatigability, Loss of Appetite, Weight Loss, Somatic Preoccupation and Loss of Libido. The respondent was asked to mark the most characteristic statement according to their experience within "past week, including today" (Beck, Steer, & Brown, 1996).

As mentioned in chapter 1 of the thesis, the second edition of the BDI was developed to correspond criteria for depression diagnosis stated in the DSM-IV. Moran and Lambert (1983) even reported that the original BDI addressed only six out of the nine DSM-III criteria for diagnosing depression and two criteria were reflected only partially. Addressing increases in appetite and sleep as well as items explicitly asking about psychomotor activity and agitation were also needed. Thus, modernisation of the content was necessary.

Four items (Weight Loss, Body Image Change, Somatic Preoccupation and Work Difficulty) were replaced by different items, namely Agitation, Worthlessness, Concentration Difficulty, and Loss of Energy. These new items were added so that the BDI-II fully addressed symptoms of severe depression and depression requiring hospitalisation. Furthermore, Changes in Sleeping Pattern as well as Changes in Appetite were reworded to reflect both increases and decreases of the symptom. In addition, alternative answers to some items were adjusted (Sadness, Pessimism, Past Failure, Loss of Pleasure, Guilty Feelings, Self-Dislike, Self-Criticalness, Crying, Loss of Interest, Indecisiveness, Irritability, and Tiredness or Fatigue). Moreover, the BDI-IA item 11, Irritability, was moved to the BDI-II item 17, and the BDI-IA item 17, Fatigability, was moved to the BDI-II item 20 and renamed to Tiredness or

Fatigue. The Social Withdrawal item was modified as Loss of Interest in order to address both loss of interest in people and activities. In conclusion, only three items (Punishment, Suicidal Ideas, and Loss of Libido) were not reworded. However, their names were changed. These changes were made especially due to decreased effectiveness of certain items. Weight Loss, for instance, depends on the duration of disorder, depression was nevertheless recognized during the 1990s earlier than during the 1960s. In addition, the time frame of the BDI-IA was extended in the BDI-II to two weeks to match better the DSM-IV criteria (Beck, Steer, & Brown, 1996).

Besides the three main versions of the BDI, there are several other editions, created to address specific needs of different respondent samples. Among the famous ones it is useful to describe the Beck Depression Inventory-Short Form (BDI-SF; Beck & Steer, 1993), the Beck Depression Inventory-Fast Screen for Medical Patients (BDI-FS; Beck, Steer, & Brown, 2000), the Modified Beck Depression Inventory (mBDI; Dori & Overholser, 2000) and the applied version of the Beck Depression Inventory (BDI-V; Schmitt et al., 2003).

The BDI-SF is a 13-item questionnaire with sound psychometric properties and high convergent validity with the original. This version is nevertheless rarely used due to low time demands of the original (Gottfried, 2015), although it found its position in gerontopsychiatry (Preiss & Vacíř, 1999). The BDI-SF is derived from the original BDI by assessing the cognitive-affective subscale, i.e. items 1 to 13, alone, as suggested by Beck and Steer in the manual from 1993. Therefore, similar scale may be administered to medically ill patients, who might evince higher scores in the second part of the original BDI, so-called "somatic-performance subscale". Scores of 10/11 were reported to be associated with moderate and severe depression in these patients, although Furlanetto, Mendlowicz and Romildo (2005) suggested the score of 9/10 for screening purposes, high sensitivity and negative predictive value and the score of 13/14 for diagnostic purposes, high specificity and positive predictive value.

The Beck Depression Inventory-Fast Screen for Medical Patients, originally named the Beck Depression Inventory for Primary Care (BDI-PC; Wang & Gorenstein, 2013a), is a self-report measure of depression eliminating somatic symptoms and thus convenient for medical settings. It was based on the BDI-II and composed from seven symptoms, which may be found in the questionnaire. Each of the items are also scored on a scale ranging from 0 to 3 and overall the respondent can achieve a score of 21. Sadness (Item 1) and Loss of Pleasure (Item 4) were embraced in this questionnaire since one or both these symptoms must be present in the patient for endorsing the diagnosis of depression according to the DSM-IV. Suicidal Thoughs or Wishes (Item 9) were included as an important clinical indicator of suicide risk and

Pessimism (Item 2), Past Failure (Item 3), Self-Dislike (Item 7) and Self-Criticalness (Item 8) were involved thanks to their salient loading (≥ 0.35) to the cognitive dimension in the factor analysis conducted by Beck, Steer and Brown (1996) and presented in the manual for the BDI-II. It was observed that this dimension may stand as an independent measure, its test-retest reliability was .82, it evinced high internal consistency (α = .86), moderate correlation with the Hamilton Depression Scale (r = .62, p < .001) and the cut-off score of 4 revealed the maximum clinical efficiency with 82% sensitivity and specificity rates. The results were not dependent on gender, age, ethnicity or type of medical diagnosis (Beck, Guth, Steer, & Ball, 1997).

The Modified Beck Depression Inventory consists of 21 items determining depressive symptomology, but although it retains the original BDI-II topics addressed by the questions, the items are stated in a positive manner (for example "I am hopeful about my future"). The answers are negative as in the original, one extra statement is nevertheless added to complete the range of possible feelings. The responses thus range from 0 – Positive experience to 4 – Severe negative experience and the respondent can achieve a score ranging from 0 to 84. This tool was reported to have high internal consistency (α = .90-.94) and adequate test-retest reliability (r = .72). The mBDI was observed to be a reliable measure of severity of depression and while it did not improve differentiation in depression severity or assessment of remission in comparison to the original BDI-II, it detected differences in depression level better if the overall depression of the respondent was low (Dori & Overholser, 2000).

The applied version of the Beck Depression Inventory was developed to measure depressive symptoms in occupational settings as these may engender low productivity and thus loss of profits. Its authors adjusted the original BDI, well-established in clinical settings, to its new use in epidemiological studies and reduced time demands of its administration. Hence, one item (Weight Loss) was dropped. The responses were limited to only one statement and the frequency of its experience was rated on a six-level scale. The total sum scores range from 0 to 100 (Rose, March, Ebener, & du Prel, 2015). The questionnaire has sound internal consistency (α = .94) and correlates strongly with the original, r = .83 (Schmitt et al., 2003).

2.3 Description of the Beck Depression Inventory, second edition

The second edition of the Beck Depression Inventory is a self-assessment measure of depression severity consisting of 21 items addressing cognitive, affective, motivational and physiological symptoms of depression (Gottfried, 2015), which may be used in adults and adolescents older than 13 years. This questionnaire was designed to address the DSM-IV diagnostic criteria, however this tool is not supposed to provide a clinical diagnosis. It better

serves as an auxiliary measure to indicate presence and degree of depressive symptoms, since depression may be an accompanying disorder to a wide range of other psychiatric illnesses (Beck, Steer, & Brown, 1996).

Each of the items is rated on a scale ranging from 0 to 3. Each of the numbers is associated with a corresponding statement describing a certain level of difficulties of a given type. The number "0" addresses the lowest level of a symptom, whereas the number "3" is connected to the most severe problem. For example, a respondent may answer the first item, Sadness, by number "0", corresponding to the statement "I do not feel sad", "1", meaning "I feel sad much of the time", "2", "I am sad all the time", or "3", "I am so sad or unhappy I can't stand it" (Beck, Steer, & Brown, 1996).

2.4 Administration and Scoring

The BDI-II may be easily administred and scored by well-trained paraprofessionals, however the scores should be interpreted only by professionals with clinical training and experience, acknowledging the test utilisation guidelines in Standards for Educational and Psychological Testing (American Educational Research Association, 2014). The interpretation should also be followed by appropriate therapeutic intervention if necessary, for example when they conclude there is a considerable risk of suicide. Therefore, special attention should be paid to the items referring to Pessimism and Suicidal Thoughts or Wishes (Beck, Steer, & Brown, 1996).

Despite the aforementioned drawbacks, the BDI-II evinces a high level of user-friendliness. The only demands are put on sufficient lighting and silence in the respondent's surroundings to allow them to focus on the questions. Another requirement is literacy and no visual impairments or attention and comprehension difficulties representing obstacles in reading and understanding the material. In case of such problems, the items may be read aloud like the first edition of the BDI used to be administered. In regular conditions, an administration should not take longer than 10 minutes (Beck, Steer, & Brown, 1996).

When administering the BDI-II using a pencil-and-paper method, the instructions are as following: "This questionnaire consist of 21 groups of statements. Please read each group of statements carefully, and then pick out one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number. Be sure that you do not choose more than one statement for any group,

including Item 16 (Changes in Sleeping Pattern) and Item 18 (Changes in Appetite)." (Beck, Steer, & Brown, 1996). The last sentence is omitted in the Czech version.

In case the BDI-II is administered orally, suggested instructions are: "This is a questionnaire. On the questionnaire are groups of statements. I will read a group of statements; then I would like you to pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today." At this moment, the examiner hands a copy of the inventory to the respondent. "Here's a copy for you so that you can follow along as I read." After reading the statements in the first group, the instructions continue as: "Now, which of the statements best describes the way you have been feeling during the past two weeks, including today?" When the interviewee decides for the number of a statement, it is useful to re-read the selected statement and ensure that the respondent understands the rating system. If so, the numerical answers may be sufficient to determine their choice (Beck, Steer, & Brown, 1996).

Beck (1967) has reported effect of memory and response sets for the original BDI and Hatzenbuehler, Parpal, and Matthews (1983) observed decreasing total scores during repeated administrations. Similar findings were discovered by Longwell and Truax (2005), when scores significantly decreased for nonclinical participants, who were assigned the BDI-II weekly, which suggested effect of measurement and its frequency. Therefore, changes in scores may be the result of a measurement effect and clinicians should thus be careful when making decisions based on the BDI-II (Wang & Gorenstein, 2013b).

Another issue was raised by Dahlstrom, Brooks, and Peterson (1990), who suggested randomized order of statements within each item to prevent over-indicating the first and the last statement. Beck, Steer, and Brown (1996) nonetheless argued that similar random order may complicate endorsement of the matching statements to patients with severe difficulties. It may be observed, however, that such patients have an inclination to extreme responds in both the directions. The authors suggest in such cases to point out that the respondents rarely experience all the symptoms on the same level and invite the patient to reconsider some of them.

The BDI-II is scored in a rather straightforward way. The ratings for each of the 21 items are summed and the severity of depression is evaluated according to the total score. Beck, Steer, and Brown (1996) suggest 0 to 13 points for nondepressed patients, 14 to 19 for mildly depressed, 20 to 28 for moderately depressed and 29 to 63 for severely depressed. In case the examinee indicates multiple endorsements for an item, the highest rating is used. If a statement with high rating is endorsed in case of the Item 16 (Changes in Sleeping Pattern) and the Item 18 (Changes in Appetite), special clinical attention should be paid to the potential increase or

decrease in the symptom and this difficulty should be addressed during the treatment. In addition, special attention must be dedicated to the content of responses, especially in respect to the Item 9, Suicidal Thoughts and Wishes, (Beck, Steer, & Brown, 1996), and the Item 2, Pessimism, since the original item in the BDI was observed to be nearly as predictive of eventual suicide (Beck, Steer, Kovacs, & Garrison, 1985) as the Beck Hopelessness Scale (BHS; Beck & Steer, 1988). To prevent a suicide risk, the clinician should also investigate the tendencies according to the patient's vegetative symptoms, especially sleeping and eating, which may also be correlated with suicidal ideation (Beck, Steer, & Brown, 1996).

The interpretation of the scores should be, however, based on clinical considerations according to the purpose of the administration of the questionnaire. The original version of the BDI-II was interpreted according to the classification of the patients of the University of Pennsylvania into four groups based on the severity of their symptoms. This severity was assessed by the outpatient version of the Structured Clinical Interview for DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1990) and the cut-off scores were derived through the use of receiver operating characteristic (ROC) curves. Since the purpose of the test was mainly clinical, the authors decided to set the cut-off scores to increase its sensitivity and avoid as many false negatives as possible. The authors nevertheless suggest adjusting the threshold and thus the cut-off score to the purpose of testing. In research, the number of false positive daignoses may be minimalized by a cut score of 17, which is connected to 93% true positive and 18% false positive diagnoses (Beck, Steer, & Brown, 1996).

At the end of the report it is useful to enumerate the items, which were rated "3" or "2" by the patient to further observation of symptoms. According to statistical studies, most of the healthy individuals rarely endorse the score of "2" or "3" in items. Very low scoring, such as total score of 0 to 2, may suggest tendency to distort information about one's experience (Preiss & Vacíř, 1999).

2.5 Differential Mean Scores in the BDI-II Dependent on Country of Origin and Other Socio-Demographic Factors

In the review by Wang and Gorenstein (2013b) means ranged from 5.1 to 38.4, where psychiatric samples presented the highest mean scores, medical samples intermediate and non-clinical samples the lowest means. Beck, Steer and Brown (1996), for example, observed the mean score of 22.45 (SD = 12.75) in their sample of psychiatric outpatients (N = 500) and the mean score of 12.56 (SD = 9.93) in the student sample (N = 120). They also reported means

for patients diagnosed with major depressive episode, major depressive disorder and dysthymia (M = 28.1, M = 29.4 and M = 24.0, respectively).

However, in the previous studies, certain associations between total sum score and ethnicity, gender, age, education, and civil status are often reported. In the following chapters, these associations and psychometric properties of the BDI-II investigated in the original studies by Beck and his colleagues as well as validation studies adapting the instrument for different language and culturally-specific groups and testing its psychometric properties with non-clinical samples, will be presented. The studies are presented in an order reflecting their geographical location - the original study, Europe, Central and Southern America, Asia and Africa.

As far as the ethnicity is concerned, Beck, Steer and Brown (1996), whose sample consisted of 91% Caucasian, 4% African American, 4% Asian American and 1% Hispanic respondents, argued that there was no correlation between the scores and race or ethnicity of participants.

The diagnosis of depression in general, however, should be executed when taking culturally-relevant specifics into account. Certain cultures tend to describe their depressive symptoms, often combined with anxiety or somatoform disorders, in somatic terms, such as “nerves” or “headaches” (Latino and Mediterranean cultures), “weakness”, “tiredness” or “imbalance” (Asian cultures), “problems of the heart” (Middle Eastern cultures) or being “heartbroken” (Hopi). Representatives of different cultures also tend to attribute importance to different symptoms, for instance, irritability may thus be more of a burden than sadness or social withdrawal. Culturally distinctive experiences, such as feelings of being visited by the ones who have already died, must be distinguished from hallucinations and delusions, although these must also be properly clinically investigated (American Psychiatric Association, 2000).

Similarly, the BDI-II must be adjusted to different groups of respondents of various countries, cultures and languages. Abubakar et al. (2016), for instance, modified the administration of the BDI-II for the low literacy level of the population in Kenya, and the adaptation process of the BDI-II was completed by adding culturally-relevant idioms, which would indicate presence of depression, for example „thinking too much“ or „having a tired heart“.

According to the review by Wang and Gorenstein (2013b), the Beck Depression Inventory was translated to 17 languages, such as English, French, Spanish, Portuguese, Dutch, Chinese, Arabic, Japanese or Icelandic, and used in Europe, the Middle East, Asia, and Latin America. Despite its use in a wide range of languages and cultures, information on

cross-cultural comparability in terms of various endorsement of items due to cultural and language differences, is still not sufficient, although certain differences may be observed. In Table 2, the validation studies from different countries and languages together with the nature of the sample, number of participants in the study, means and standard deviations obtained, may be observed.

Author, year	**Language**	**Country**	**N**	**Sample**	**M**	**SD**	**Range**
Beck, Steer and Brown (1996)	English	USA	120	Student	12.56	9.93	NR
Roelofs et al. (2013)	Dutch	Netherlands	7500	Adult	10.6	10.9	0 – 62
Jakšić et al. (2013)	Croatian	Croatia	314	Adult	10.35	10.27	0 – 51
Arnarson et al. (2009)	Icelandic	Iceland	1206	Student	8.80	7.82	NR
Aasen (2001)	Norwegian	Norway	875 303	Adult Student	8.12 7.12	7.5 6.0	NR
Sanz et al. (2003)	Spanish	Spain	470	Adult	9.4	7.7	NR
Campos & Gonçalves (2011)	Portuguese	Portugal	538	Student	8.88	7.85	NR
Kapci et al. (2008)	Turkish	Turkey	153 50	Women Men	14.99 14.09	9.19 9.72	NR
González et al. (2015)	Spanish	Mexico	420 220	Student Adult	9.31 9.82	7.84 7.70	NR
Gomes-Oliveira et al. (2012)	Portuguese	Brazil	182	Adult	9.87	10.71	NR
Ghassemzadeh et al. (2005)	Persian	Iran	125	Student	9.79	7.96	NR
Al-Turkait & Ohaeri (2010)	Arabic	Kuwait	624	Student	15.5	8.5	NR
Kojima et al. (2002)	Japanese	Japan	766	Adult	8.90	6.52	NR
Ginting et al. (2013)	Bahasa Indonesia	Indonesia	720	Adult	14.20	9.7	NR
Abubakar et al. (2016)	Swahili	Kenya	221	Adult	18.20	8.06	NR

Table 2. Summary of validation studies for different countries and languages.

NR = not reported.

As the table shows, the means range from 7.12 (SD = 6.0) for the student sample of the Norwegian study Aasen (2001) to 15.5 (SD = 8.5) for the student sample of the study of the

Arabic version of the BDI-II in Kuwait (Al-Turkait & Ohaeri, 2010). The authors of this study also reported that their mean was significantly different from studies in other countries.

It is also worth mentioning that the sample sizes of these studies differed. As may be seen, Roelofs et al. (2013) reported the mean BDI-II score of 10.6 (SD = 10.9) for their voluminous (7500 respondents) Dutch community sample, whereas Kapci, Uslu, Turkcapar and Karaoglan (2008) reported the mean scores of 14.99 (SD = 9.19) and 14.09 (SD = 9.72) for women and men in the Turkish population, respectively, where the male part of the sample consisted of 50 respondents. These authors also did not report mean for the whole sample. Similarly, only two studies (Jakšić et al., 2013; Roelofs et al., 2013) reported ranges of their data.

Some studies also provide information on two types of samples, i.e. adult and student (Aasen, 2001; González, Rodríguez, & Reyes-Lagunes, 2015).

As far as the relationship between gender and total sum score is concerned, Beck, Steer and Brown (1996) reported in the original manual that there was an association between the mean score in the BDI-II and gender, since women scored significantly higher in both the psychiatric outpatient and student sample (M = 23.61; SD = 12.31; M = 14.55, SD = 10.74, respectively) than men (M = 20.44; SD = 13.28; M = 10.04, SD = 8.23, respectively). Given the fact that the authors suggested considering the total sum score of 14 and higher mild depressive symptoms, it is useful to mention that the female part of the student sample scored higher than it could be predicted. In Table 3, the means for male and female parts of the samples are reported and significant differences are marked.

Author, year	Sample	M (SD) - women	M (SD) - men	Significance
Beck, Steer and Brown (1996)	Student	14.55 (10.74)	10.04 (8.23)	*
Roelofs et al. (2013)	Adult	NR	NR	*
Jakšić et al. (2013)	Adult	NR	NR	ns
Arnarson et al. (2009)	Student	NR	NR	NR
Aasen (2001)	Adult Student	8.9 (7.7) 7.4 (5.8)	7.3 (7.1) 6.4 (6.1)	* ns
Sanz et al. (2003)	Adult	10.2 (7.7)	8.5 (7.5)	*
Campos & Gonçalves (2011)	Student	9.72 (7.82)	7.64 (7.74)	*
Kapci et al. (2008)	Adult	14.99 (9.19)	14.09 (9.72)	ns
González et al. (2015)	Student Adult	10.14 (NR) 10.85 (NR)	8.03 (NR) 8.51 (NR)	*
Gomes-Oliveira et al. (2012)	Adult	11.43 (11.62)	7.88 (9.12)	*
Ghassemzadeh et al. (2005)	Student	NR	NR	ns
Al-Turkait & Ohaeri (2010)	Student	16.2 (8.8)	14.04 (7.5)	*
Kojima et al. (2002)	Adult	9.9 (6.4)	8.3 (6.5)	*
Ginting et al. (2013)	Adult	14.10 (8.6)	14.20 (10.7)	ns
Abubakar et al. (2016)	Adult	NR	NR	NR

Table 3. Differences between male and female parts of samples in the studies.

* = significant difference.

ns = not significant.

NR = not reported.

As may be observed in the table, some studies (Al-Turkait & Ohaeri, 2010; Campos & Gonçalves, 2011; Gomes-Oliveira et al., 2012; González et al., 2015; Kojima, Furukawa, Takahashi, & Kawai, 2002; Roelofs et al., 2013; Sanz, Perdigón, & Vásquerz, 2003) reported a significant difference between the total sum scores of men and women, with women scoring higher than men. In addition, although the Indonesian study (Ginting, Näring, van der Veld, & Srisayekti, 2013) did not reveal any significant difference in the non-clinical sample and men even scored higher than women, these authors reported significant difference between men and women in another part of the sample, i.e. in the group of patients with coronary heart disease

(M = 13.20; SD = 9.50 vs. M = 10.90; SD = 7.30). Campos and Gonçalves (2011) also argued that women scored higher than men in 5 of the 21 items, namely 1, 10, 15, 18 and 21, after Bonferroni correction.

On the contrary, some studies (Ghassemzadeh, Mojtabai, Karamghadiri, & Ebrahimkhani, 2005; Jakšić et al., 2013; Kapci et al., 2008), did not reveal any association between mean score and gender.

The Norwegian study by Aasen (2001) revealed a relationship between gender and score, with women scoring significantly higher than men, only in the adult sample. In the student sample, gender did not correlate with the score.

In the student sample of Beck, Steer and Brown (1996), age was inversely correlated with the BDI-II scores. Jakšić et al. (2013) as well as Sanz et al. (2003) nonetheless reported a positive correlation between age and mean scores and other authors (Ghassemzadeh et al., 2005; González et al., 2015; Kojima et al., 2002; Roelofs et al., 2013) did not observe any relationship between the scores in the BDI-II and age.

Some authors suggested an association between the mean scores and the educational level. In the studies by Roelofs et al. (2013), Jakšić et al. (2013) and Sanz et al. (2003), the educational level correlated negatively with the mean scores.

The Spanish version (Sanz et al., 2003) also reported civil status differences. Divorced, separated and widowed respondents scored higher than married persons or people cohabiting in a stable couple.

2.6 Reliability

2.6.1 Item Characteristics and Internal Consistency

As the BDI-II was adjusted in terms of item endorsement rate, content coverage and homogeneity in comparison to the previous versions, non-clinical participants tend to report the lowest possible scores for the items, which results in a skewed distribution (Wang & Gorenstein, 2013b) with an average item score below 1 in non-clinical samples (Alansari, 2005) and below 2 in most clinical samples. However, language version, type of sample, age range, education level, and severity of depression may affect the difficulty of item endorsement (Wang & Gorenstein, 2013b).

The Item 9, Suicidal Thoughs or Wishes, evinces the lowest endorsement rate, whereas the highest score is achieved on the Item 15 – Loss of Energy (Jakšić et al., 2013). The Item 21, Loss of Interest in Sex, has the worst item-total correlation despite its relation to the whole construct (Beck, Steer, & Brown, 1996). Moreover, somatic items, such as the Item 16, Changes

in Sleeping Pattern, and the Item 18, Changes in Appetite, were often connected to lower scores in non-clinical samples (Wang & Gorenstein, 2013b).

Whereas the previous versions of the BDI reached the average Cronbach's alpha coefficient of around .85 (Beck, Steer, & Brown, 1996), the average alpha coefficient for the BDI-II is .90, ranging approximately from .83 to .96, which may be caused by increased homogeneity of the scale thanks to the replacement of certain items, as may be observed in the chapter 2.2 – History and Editions of the Beck Depression Inventory. The adjustment of some items in terms of both increase and decrease of the symptoms also contributed to its assessment of different types of depression, for example atypical depression (Wang & Gorenstein, 2013b).

A coefficient alpha of .92 for the psychiatric outpatient sample and of .93 for the student sample as well as the median item-total scale correlation of .59 and of .62 was reported by Beck, Steer and Brown (1996) in the manual for the BDI-II, when 17 out of 21 items evinced correlation higher than r = .5 with the total. The summary of Cronbach's alphas and item-total correlations in previous studies may be observed in Table 4.

Author, year	Sample	Cronbach's alpha	Lowest item-total correlation	Highest item-total correlation
Beck, Steer and Brown (1996)	Student	.93	.32 (Changes in Appetite)	.74 (Self-Dislike)
Roelofs et al. (2013)	Adult	.95	NR	NR
Jakšić et al. (2013)	Adult	.94	.44 (Loss of Interest in Sex)	.75 (Tiredness or Fatigue)
Arnarson et al. (2009)	Student	.91	NR	NR
Aasen (2001)	Adult Student	.91 .86	.37 (Punishment Feelings) .32 (Loss of Interest in Sex)	.66 (Self-Dislike) .61 (Crying)
Sanz et al. (2003)	Adult	.89	.33 (Changes in Appetite)	.60 (Worthlessness)
Campos & Gonçalves (2011)	Student	.90	NR	NR
Kapci et al. (2008)	Adult	.90	.13 (Loss of Interest in Sex)	.70 (Loss of Energy)
González et al. (2015)	Student Adult	.90 .87	.46 (Suicidal Thoughts or Wishes) .39 (Changes in Sleeping Pattern)	.73 (Concentration Difficulty) .68 (Self-Dislike)
Gomes-Oliveira et al. (2012)	Adult	.93	.44 (Punishment Feelings)	.73 (Worthlessness)
Ghassemzadeh et al. (2005)	Student	.87	.17 (Loss of Interest in Sex)	.67 (Loss of Interest)
Al-Turkait & Ohaeri (2010)	Student	.83	NR	NR
Kojima et al. (2002)	Adult	.87	.30 (Crying)	.57 (Worthlessness)
Ginting et al. (2013)	Adult	.90	NR	NR
Abubakar et al. (2016)	Adult	.89	.17 (Past Failure)	.64 (Concentration Difficulty)

Table 4. Summary of internal consistencies, the lowest and the highest item-total correlations in the studies.

As the table demonstrates, Cronbach's alpha ranged from .83 (Al-Turkait & Ohaeri, 2010) to .95 (Roelofs et al., 2013). The least correlated items with the total were Item 21 – Loss of Interest in Sex (Aasen, 2001; Ghassemzadeh et al., 2005; Jakšić et al., 2013), Item 18 – Changes in Appetite (Beck, Steer, & Brown, 1996; Sanz et al., 2003) and Item 6 – Punishment Feelings (Aasen, 2001; Gomes-Oliveira et al., 2012), and the most correlated items were Item 7 – Self-Dislike (Aasen, 2001; Beck, Steer, & Brown, 1996; González et al., 2015), Item 18 - Worthlessness (Gomes-Oliveira et al., 2012; Kojima et al., 2002; Sanz et al., 2003) and Item 19 – Concentration Difficulty (Abubakar et al., 2016; González et al., 2015).

In addition to the differences according to different countries and languages, it is nevertheless worth mentioning that the nature of the sample itself often plays an important role. Ginting et al. (2013), for example, reported Cronbach's alphas ranging from .87 to .91, depending on the nature of their Indonesian sample.

2.6.2 Test-Retest Reliability

Test-retest reliability analyses suggested good to excellent Pearson's r, ranging from .73 to .96. The interval of re-administration ranged from 1 week to 6 months. These data were however acquired from non-clinical samples and can reflect a short interval between the two administrations, since longer intervals may engender changes in depression symptoms, which may appear naturally, and therefore lower correlation (Wang & Gorenstein, 2013b). This reliability is thus considerably higher than an average coefficient around .65, found in the previous versions (Yin & Fan, 2000).

Beck, Steer and Brown (1996) reported test-retest reliability of .93 with one week interval, with the first session mean of 20.27 (SD = 10.46) and the second session mean of 19.42 (SD = 10.38).

Arnarson, Ólason, Smári and SigurÐsson (2009) observed test-retest reliability of r = .89 in the Icelandic sample, Aasen (2001) found r = .77 for the Norwegian sample and Kapci et al. (2008) reported r = .94 for their Turkish version. Gomes-Oliveira et al. (2012) reported intraclass correlation coefficient of .89 for the retest reliability in the student sample of their validation study. Ghassemzadeh et al. (2005), on the other hand, observed the Pearson correlation coefficient of .73 for the Persian version in the Iranian sample and Ginting et al. (2013) observed r = .55 in repetitive testing of the Indonesian version.

2.7 Validity

2.7.1 Concurrent and Discriminant Validity

Correlations between the previous versions and the BDI-II are high, with the BDI and the BDI-II correlation ranging from .82 (Kapci et al. 2008) to .93 (Dozois et al., 1998) and the BDI-IA and the BDI-II correlation being .93 (Beck, Steer, Ball et al., 1996). The means nevertheless differ by 2.96 poins in the total sum score, with the BDI-II items being rated higher (Beck, Steer, & Brown, 1996).

The construct measured by the BDI-II correlated moderately or strongly with other measures of depression, for example the CES-D (r = .81; Arnarson et al., 2009), the HRSD (r = .66; Joe, Woolley, Brown, Ghahramanlou-Holloway, & Beck, 2008), the MADRS (r = .75;

Gomes-Oliveira et al., 2012), the SDS (r = .71; Aasen, 2001), the PRIME-MD (r = .84; Dum, Pickren, Sobell, & Sobell, 2008), HADS-D (r = .71; Arnarson et al., 2009), the depression subscale of the DASS (r = .77; Osman et al., 1997), the depression subscale of the SCL-90-R (r = .57-.84) or the EPDS (r = .72-.74; Wang & Gorenstein, 2013b). In addition, strong correlation (r = .77; Ghassemzadeh et al., 2005) was observed with the Automatic Thoughs Questionnaire (ATQ; Hollon & Kendall, 1980).

Clinical attention must be nevertheless dedicated to its correlation with scales assessing anxiety, such as the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988), with the correlation of r = .60 (Beck, Steer, & Brown, 1996), the Hamilton Anxiety Rating Scale (HAM-A; Hamilton, 1959), r = .47 (Beck, Steer, & Brown, 1996), or the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), with a rough estimate of correlation of .50. This relationship may be associated with symptomatic co-occurrence and comorbidity of these two disorders (Wang & Gorenstein, 2013b). The results of the BDI-II also correlate with the BHS (r = .68) and the Scale for Suicide Ideation (r = .37; SSI; Beck, Kovacs, & Weissman, 1979).

As far as discriminant validity is concerned, correlations were low with measures of alcohol and drug use, specifically with Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), r = .33 (Dum et al., 2008) and with the Drug Abuse Screening Test (DAST; Skinner, 1982), r = .26 (Dum et al., 2008), and with chronic pain measures, namely The McGill Pain Questionnaire (Melzack, 1975), r = .32 (Harris & D'Eon, 2008).

2.7.2 Content and Construct Validity

The content coverage of the test was derived from the definition of the construct and a list of items was then created to cover it (Beck, Steer, & Brown, 1996). The instrument thus evinces an appropriate content validity in comparison to the DSM-IV (Kjærgaard, Wang, Waterloo, & Jorde, 2014), as may be observed in the chapter 1.3 – Symptoms of Depression, where the symptoms are presented according to the items in the questionnaire.

Construct validity investigates the quality of measuring of a construct based on a certain theory by a given psychological instrument. Construct validation thus refers to simultaneous procedure of measurement and theory validation (Strauss & Smith, 2009). Factor analysis and other statistical methods may serve to investigate structural or construct validity of the instrument in terms of exploration of the latent trait measured and the representation of depression which such a tool provides, since the BDI-II was not based on a concrete theory of

depression. Similar factor analysis then determines psychological variables that influence test performance and describe the latent structure of the test (Wang & Gorenstein, 2013b).

The motivation to analyse factors of consequently the BDI, the BDI-IA and recently the BDI-II originates in the theoretical requirement to cast light on the structure of Beck's questionnaires, but also the clinical necessity to comprehend the use of scores of the BDI-II and whether they may or may not be applied in the form of subscales or only the total (Abubakar et al., 2016), although some authors (Brouwer, Meijer, & Zevalkink, 2013b) concluded that the BDI-II total scale score should be interpreted as a single construct in order to prevent misleading conclusions.

Within the literature evidence may be found for different models, including one, two or three factors, with a robust dimension of general depression composed by two constructs – cognitive-affective and somatic-vegetative, or somatic-affective and cognitive. The between-factor correlation coefficients are also generally high, in a range between .49 to .87, and account for a large amount of variance (Wang & Gorenstein, 2013b), such as 47.34% for the Croatian version (Jakšić et al., 2013), 42.61% for the Turkish version (Kapci et al., 2008) or 37.5% for the Japanese version (Kojima et al., 2002). These solutions supported the DSM-IV suggestion to consider cognitive-affective symptoms central to the diagnosis, which may be further completed by vegetative-somatic symptoms (Wang & Gorenstein, 2013b).

A summary of the factor structure found in the validation studies may be observed in Table 5.

Author, year	Method	Factor 1	Factor 2	Factor 3
Beck, Steer and Brown (1996)	EFA	Cognitive-affective	Somatic	-
Jakšić et al. (2013)	EFA	Somatic-affective	Cognitive	-
Arnarson et al. (2009)	CFA	Cognitive	Affective	Somatic
Aasen (2001)	CFA	Negative attitude	Performance difficulty	Somatic element
Sanz et al. (2003)	EFA	Cognitive-affective	Somatic-motivational	-
Campos & Gonçalves (2011)	EFA	Cognitive-affective	Somatic	-
Kapci et al. (2008)	EFA	Performance difficulty/ Somatic	Negative attitude	-
González et al. (2015)	CFA	Depressed mood and motor complaints	Negative cognitions	-
Ghassemzadeh et al. (2005)	CFA	Cognitive-affective	Somatic-vegetative	-
Al-Turkait & Ohaeri (2010)	CFA	Cognitive-affective	Somatic	-
Kojima et al. (2002)	EFA	Somatic-affective	Cognitive	-
Ginting et al. (2013)	CFA	Cognitive	Affective	Somatic
Abubakar et al. (2016)	CFA	Depression Cognitive-affective Negative attitude	 Somatic Impaired performance	 Somatic

Table 5. Summary of factor analyses results in foreign studies.

EFA = exploratory factor analysis.

CFA = confirmatory factor analysis.

The proponents of the one-factorial solution are Abubakar et al. (2016), although their confirmatory factor analysis revealed three possible models. Besides their one-factorial model (depression), which they advocated thanks to its strong factor loading for almost all the items, two-factorial (cognitive-affective and somatic factor) and three-factorial (negative attitude, impaired performance and somatic symptoms) solutions were available.

The original study by Beck, Steer and Brown (1996) proposed two factor solutions. Whereas for the data of the sample of psychiatric outpatients the somatic-affective and the cognitive factor solution was more appropriate, the data of the student sample was described by the cognitive-affective and the somatic factor. The between factor correlations were r = .66 and r = .62 for the outpatient and the student sample, respectively. The nature of the outpatient sample dimensions may be observed in the chapter 1.3 – Symptoms of Depression, where the enumeration of the symptoms according to the BDI-II items loaded on the two factors is presented. The cognitive-affective factor of the student sample data included Item 1 – Sadness, Item 3 – Past Failure, Item 4 – Past Failure, Item 5 – Guilty Feelings, Item 6 – Punishment Feelings, Item 7 – Self-Dislike, Item 8 – Self-Criticalness, Item 9 – Suicidal Thoughts or Wishes, Item 10 – Crying, Item 11 – Agitation, Item 12 – Loss of Interest, Item 13 – Indecisiveness, Item 14 – Worthlessness and Item 17 – Irritability, whereas the somatic factor involved Item 15 – Loss of Energy, Item 16 – Changes in Sleeping Pattern, Item 18 – Changes in Appetite, Item 19 – Concentration Difficulty and Item 20 – Tiredness or Fatigue. Two items, Item 2 – Pessimism, and Item 21 – Loss of Interest in Sex, did not load to any of the factors.

Sanz et al. (2003) as well as Campos and Gonçalves (2011) are also proponents of this solution, although in the Portuguese version, the items 6, 10, 13 and 17 did not load to any of the factors, item 2 loaded on the cognitive-affective factor and item 11 loaded on the somatic factor in their Portuguese sample. Ghassemzadeh et al. (2005) also proposed a cognitive-affective factor (with prominent loadings by items 1, 3, 14, and 17) and a somatic-vegetative factor (with prominent loadings by items 15, 16, 18, 19 and 20). Two items (2 and 21) had loadings less than .35 and therefore were not considered as indicators of one of the two factors. The abovementioned two-factor solution by Abubakar et al. (2016) is similar to the Beck, Steer and Brown's (1996) solution for the student sample with the difference that all the items loaded on one of the two factors. Item 2 – Pessimism, loaded on the cognitive-affective factor, whereas Item 21 – Loss of Interest in Sex, loaded on the somatic one.

Jakšić et al. (2013), on the other hand, presented in the Croatian version a solution similar to the Beck, Steer and Brown's (1996) analysis for the psychiatric outpatients, in which Items 3, 5, 6, 8 and 14 loaded on the cognitive factors, whilst the rest of the items loaded on the somatic-affective one. Similarly, Kapci et al. (2008) observed a somatic-affective and cognitive solution for their psychiatric adult outpatient sample. Although Item 1 loaded on the somatic-affective factor and Items 2 and 9 did not load to any of the factors, the rest remains identical with the Beck, Steer and Brown's (1996) results. González et al. (2015) are also proponents of this solution for their Mexican sample. The only differences were evinced by the

items which loaded on both factors, i.e. items 1, 2, 4, 5, 7, 11, 12 and 21, Item 14 – Worthlessness, which did not load to any of the factors, and Item 10 – Crying, which was salient for "negative cognitions" instead of the somatic-affective factor. Kojima et al. (2002) observed almost identical solution to the Beck, Steer and Brown's (1996) solution for the psychiatric outpatients, only Item 11 – Agitation loaded on the cognitive factor and Item 14 – Worthlessness loaded on a somatic-affective one.

A different factor solution was investigated by Kapci et al. (2008) in their non-clinical sample. They named the factors "performance difficulty/somatic" (items 2 – 5, 11 – 13, 15, 16 and 19 – 21) and "negative attitude" (items 1, 5 – 7, 9, 10, 14, 17 and 18). Item 8 – Self-Criticalness did not load to any of the factors.

Beck, Steer, Brown and Van der Does (2002) proposed a three factor solution, consisting of the cognitive (Item 1 – Sadness, Item 2 – Pessimisim, Item 4 – Loss of Pleasure, Item 9 – Suicidal Thoughts or Wishes and Item 12 – Loss of Interest), affective (Item 3 – Past Failure, Item 5 – Guilty Feelings, Item 6 – Punishment Feelings, Item 7 – Self-Dislike, Item 8 – Self-Criticalness, Item 13 – Indecisiveness and Item 14 – Worthlessness) and somatic factor (Item 10 – Crying, Item 11 – Agitation, Item 15 – Loss of Energy, Item 16 – Changes in Sleeping Pattern, Item 17 – Irritability, Item 18 – Changes in Appetite, Item 19 – Concentration Difficulty, Item 20 – Tiredness or Fatigue and Item 21 – Loss of Interest in Sex), which was later supported by Arnarson et al. (2009) in their Icelandic sample as well as by Ginting et al. (2013) in their Indonesian sample.

On the contrary, Abubakar et al. (2016) described their data, similarly to Aasen (2001) and Kapci et al. (2008), by means of the negative attitude, impaired performance and somatic symptoms factors. Whereas the last one consists of the items from Beck et al.'s (2002) somatic factor (Items 10, 11, 16, 18, 21) in the impaired performance one, items of different natures can be found (Items 4, 12, 13, 15, 17, 19, 20), and the negative attitude factor includes items from the cognitive and affective factor (Items 1 – 3, 5 – 9, 14).

Further factor analyses provide sophisticated alternatives, namely the hierarchical and the bifactor model, to the aforementioned analysis. These models express the view that a big proportion of the variance may be explained by a general construct of either hierarchical higher-order or parallel nature. The hierarchical model is represented by a higher-order general depression dimension, explaining the variance of lower-order dimensions. On the contrary, the bifactor model describes both the common two-dimensional structure and the general depression dimension, which does not nevertheless represent a hierarchical nature (Wang & Gorenstein, 2013b). In addition, certain authors advocate the use of item response theory-based

methods as opposed to the use of classical test theory when using the BDI-II, especially for the evaluation of individual change, since it may become a more accurate tool, particularly in the lowest or highest ranges of the scores (Brouwer, Meijer, & Zevalkink, 2013a).

2.8 Sensitivity and specificity

The criterion-oriented validity showed good sensitivity and specificity for detecting depression in comparison to the adopted gold standard. In most studies, the authors reported sensitivity of at least .70, although it usually reached the interval between .80 and .90. In addition, significant diagnostic accuracy, which was expressed by the area under the ROC curve, was approximately 75% and more. Slight differences may be observed according to the type of the sample, the number of respondents with depression as well as the chosen gold-standard criterion. Overall, cut-off points for non-clinical samples varied between 10 to 16, for medical samples from 7 to 20 and for psychiatric samples from 19 to 31 (Wang & Gorenstein, 2013b), as opposed to the cut-off points set by the original manual (Beck, Steer, & Brown, 1996). Patients with the diagnosis of depression had significantly higher scores (M = 23.12; SD = 8.66) than patients without (M = 8.23, SD = 7.50) (Grothe et al., 2005).

On the other hand, specificity was usually lower (Arbisi, 2001), approximately .70 to .80, as Beck, Steer and Brown (1996) reported. Certain medical samples nonetheless tended to display specificity below .70 (Warmenhoven et al., 2012).

The area under the ROC curve indicated that the discriminative property of the Turkish version of the BDI-II was .87, which determines a good level of accuracy, and total scores of 0 – 12 were suggested to indicate minimal, 13 – 18 mild, 19 – 28 moderate and 29 – 63 severe depression (Kapci et al. 2008). Gomes-Oliveira et al. (2012), on the other hand, suggested the cut-off point of 10/11 for their non-clinical sample tested by the Brazilian Portuguese version of the BDI-II. This treshold displayed a sensitivity of 70% and a specificity of 84.40%, positive predictive values of 84.30% and negative predictive values of 77%. The misclassification rate was 23.10% and the instrument could discriminate 82.10% of cases of major depressive episode according to the area under the ROC curve.

On the contrary, Ginting et al. (2013) argued that the optimal cut-off for their Indonesian sample would be 17 points, which allowed 73% depressed patients to be correctly identified as depressed and 73% non-depressed participants to obtain a negative test result. Beck, Steer and Brown (1996) also suggested a cut-off score of 17 in order to reduce the number of false positives. Such a cut-off would have a 93% true-positive rate and a 18% false-positive rate according to their research.

2.9 Czech Version

The Czech version of the BDI-II was created by Preiss and Vacíř (1999). The translation was revised four times, consulted by two translators and adjusted. The final version was tested with several patients of the Department of Neurology of the First Faculty of Medicine and General Teaching Hospital, Prague, and of the Department of Psychology of the Military University Hospital, Prague. Later, it was administered in a group of 60 young men, who had previously commenced their military service, and this process was aimed to identify incomprehensible items (M = 10.26, SD = 7.02, range 0 – 26). In this sample, the Item 16, Changes in Sleeping Pattern, evinced higher scores than other items. The authors nevertheless argued that this change might have been caused by new daily regime as well as early getting up, which most of the participants had not been used to.

In addition, the mean of total scores were also increased in this sample. Although it may be associated with higher scores in somatic depressive symptoms, this increase may be caused by the Czech translation as well. Furthermore, owing to the characteristics of the research sample and the absence of the standardisation clinical sample it was impossible to develop local norms for the Czech version as well as to investigate test-retest reliability, validity, internal consistency, sensitivity and specificity (Gottfried, 2015). Despite the fact that the authors suggest the use of original cut-off points by Beck, Steer and Brown (1996), they point out that these are only appropriate for Czech clinical-psychological and psychiatric practice, hence they cannot be generalised for different or normal population (Preiss & Vacíř, 1999).

The fact that the Czech version exists, the translation was tested and the first analyses were performed has contributed to utilisation of this method in the Czech Republic. Nonetheless, the standardisation sample of both non-clinical and clinical nature as well as reliability and validity investigation are missing, which has led us to the present analysis, as further explained in the chapter 3 – Research Aims and Methods.

II. Empirical Section

3 Research Aims and Methods

The prevalence and incidence of depression in the world is growing and the disorder tends to be diagnosed in younger age than in the past (Alda et al., 2004). In addition, depression often appears in comorbidity with various psychiatric disorders, somatic health conditions, especially of chronic nature, and difficulties in interpersonal functioning (Richards & O'Hara, 2014). It is considered to be a risk factor for health-related problems, such as cardiovascular diseases (Suls & Davidson, 2014) or obesity (Dutton & Needham, 2014) and it is often connected to alcohol-use disorder (Witkiewitz & Stauffer, 2014), multiple sclerosis (Hancock, Bruce, & Lynch, 2014), intimate relationship dysfunctions (Stroud, Feinstein, Bhatia, Hershenberg, & Davilla, 2014) and other. Moreover, increased mortality was found in patients with depression (American Psychiatric Association, 2013).

Comorbidity (Richards & O'Hara, 2014), the overlap with other disorders, as well as nonuniform manifestation of symptoms, such as weight gain or weight loss or increase or decrease in the number of hours of sleep (American Psychiatric Association, 2013), may complicate the diagnostic process. Therefore, it is essential to combine various assessment methods according to the needs of the patient and the context to diagnose the disorder and monitor the treatment-progress. Self-report measures became widely used as screening instruments thanks to their simplicity, ability to capture effectivity and efficacy of both psychosocial and psychopharmacological interventions as well as presence of different depressive symptoms and excellent psychometric properties measured in many of them (Hopko et al., 2004).

The Beck Depression Inventory (Beck et al., 1961) belongs to the most famous self-assessment methods for measuring depression (Richter et al., 1998). Its second edition (Beck, Steer, & Brown, 1996) was observed to be uncomplicated to assign, cost-effective and highly convenient for both clinical practice and research (Wang & Gorenstein, 2013). Its test-retest reliability (Beck, Steer, & Brown, 1996) and internal consistency (Dozois et al., 1998) were found to be adequate. Research shows that the BDI-II is a reliable measure for evaluating the severity of depression (Lahlou-Laforêt, Ledru, Niarra & Consoli, 2015; Subica et al., 2014) and evinces appropriate content validity in comparison to the DSM-IV (Kjærgaard et al., 2014), good sensitivity and moderate specificity (Arbisi, 2001).

The study of the Czech translation of the BDI-II (Preiss & Vacíř, 1999), aiming to identify incomprehensible items, revealed an increased mean score in comparison to foreign studies. Although this might have been influenced by the selection of the sample, it is not clear if the translation itself played a role in this difference. In addition, local norms have not yet

been established, which lead to the recommendation to use the original norms (Beck, Steer, & Brown, 1996), which is nevertheless insufficient for clinical practice. Therefore, the measure needs more research in Czech population in order to be able to evaluate its reliability and validity as well as to develop local norms, which are crucial for the use of the BDI-II in clinical settings (Gottfried, 2015).

The results of mental health measures may differ in different countries due to three types of culturally-relevant bias. The theoretical construct being studied may include components which are culturally inappropriate or irrelevant, items may have unidentical meanings in various communities (van de Vijver & Tanzer, 2004) and individuals in different cultures may differ in test taking behaviour (van de Vijver, 2002). In addition, documentation of test norms (Roelofs et al., 2013) as well as its structure in different languages (Nuevo et al., 2009), cultures (Abubakar et al., 2016) and historical contexts (Jakšić et al., 2013) needs further empirical attention. In addition, sample standardization is not demographically representative of the population and the gender and culture fairness of the items and total score were not properly investigated. Therefore, development of local norms was strongly suggested (Wang & Gorenstein, 2013b).

In the next chapters we present research focused on acquisition of norms for the BDI-II by collecting and analysing data obtained from a nonclinical part of adult Czech population (convenience sample).

4 Hypotheses and Questions

4.1 Research Aim I.

The aim of this thesis is to provide a normative study of the second edition of the Beck Depression Inventory. The norms will be created for adult Czech population. We will test the association between the score achieved in the BDI-II and three demographic variables – gender, age and education.

Research hypothesis (H_0): There is no statistically significant relationship between the score in the BDI-II and gender, age and education.

4.2 Research Aim II.

The second aim of this thesis is to provide information about psychometric properties of the BDI-II, namely the internal consistency and relationships between different items and the total score. We will also focus on the relationships between different items and demographic variables.

Research question no. 1: What is the internal consistency of the BDI-II?

Research question no. 2: What are the relationships between the total score and different items of the BDI-II?

Research question no. 3: What are the relationships between gender, age, and education, and different items of the BDI-II?

4.3 Research Aim III.

The third aim of this thesis is to compare results of foreign studies of the BDI-II. Specifically, we will be interested in means, standard deviations, ranges, maximal and minimal values and factor analysis.

Research question no. 4: How does the mean, standard deviation, range, and factorial structure of Czech data differ from data in foreign studies?

5 Research Methodology

The research design of this thesis has a nature of a non-experimental quantitative cross-sectional study. The data used for normative analysis were collected by means of cross-sectional research, whose participants where contacted on the basis of quota and voluntary response sampling, i.e. convenience sample (Hendl, 2015). The participants were selected with taking three demographic variables – gender, age and education – into account. Balanced number of men and women and sufficient number of participants in different age and education groups were controlled.

5.1 Data Collection

Data were collected from 616 participants from 14 regions of the Czech Republic. The majority of them lived in Prague (434), some came from towns (138) and villages (44). The majority of the sample (606; 98.38%) were Caucasian and of Czech nationality, 5 (.8%) reported Slovak origins, 4 (.6%) reported Kazakhstani origins, 1 (.2%) reported Danish origins and 1 was Asian (.2%).

The first part of the sample, 349 participants, were contacted and tested by the author of the thesis. The second part of the sample, 267 participants, were tested by students of psychology at the Prague College of Psychosocial Studies, who were properly trained in administration and scoring of the method at the beginning of the project. The data were collected between February and December 2016 on the basis of snowball sampling technique (Hendl, 2015), thus recruitment in cooperation with the participants and their social network. However, 39 participants were excluded from the study due to missing values in the BDI-II or important demographic variables in the anamnestic questionnaire.

At the beginning of administration, the project was introduced to the participants, they signed an informed consent according to common ethical standards and agreed on participating in a study. A copy of the informed consent with the description of the study was provided to the participant. The informed consent can be found in Appendix 1.

A pilot study, which was supposed to clarify potential drawbacks of the approach, including suitability of the methods and clarity of questions, was conducted with 10 participants. These participants were asked to notice possible ambiguities in instructions. The participants were nevertheless satisfied with information given and no adjustments were needed.

The duration of administration ranged from 5 to 20 minutes, depending on individual motivation and psychomotor activity. Most of the participants finished their work in approximately 10 minutes.

5.2 Demographic Variables

The study focused on participants older than 18 years. In order to minimalize potential presence of extraneous variables, the reason for exclusion from the study was psychiatric diagnosis, such as depression, anxiety, substance abuse disorder or dementia, use of antidepressants or anxiolytics and neurological conditions, such as brain injury, cerebral apoplexy, encephalitis or epilepsy. In addition, participants with autoimmune liver disease (Hames et al., 2016), multiple sclerosis (Patten, Beck, Williams, Barbui, & Metz, 2003), myocardial infarction (Bagherian-Sararoudi, Saneei, & Baghbanian, 2011), ankylosing spondylitis (Meesters et al., 2014), Sjogren's syndrome (Valtýsdóttir, Gudbjörnsson, Lindqvist, Hällgren, & Hetta, 2000), herpesviridae (Coughlin, 2012), hypothyroidism (Duntas & Maillis, 2013) and cancer (Nezu, Nezu, Greenberg, & Salber, 2014) in anamnestic questionnaire were also excluded, since these conditions may be connected to depression as well. Hence, 127 participants were excluded according to these criteria.

After considering abovementioned criteria 450 participants between the age of 18 to 96 were included in the study. Detailed description of demographic characteristics of the selective sample of this thesis is presented in Table 6.

	Number of participants (N = 450)	Number of participants (%)
Gender		
Men	206	45.8
Women	244	54.2
Age		
18-30	167	37.1
30-40	41	9.1
40-50	54	12.1
50-60	79	17.6
60-70	58	12.9
70+	51	11.2
Education		
Secondary	55	12.2
Higher	225	50.0
University degree	170	37.8

Table 6. Demographic characteristics of the selective sample.

Note. Secondary education = the participant completed compulsory school attendance. Higher education = the participant completed high school and obtained a maturita exam. University degree = the participant completed university education and obtained a degree.

5.3 Procedure

The participants of the study filled in individually two methods (a questionnaire and an inventory) by means of a pencil-and-paper method of assessment. The content of both the questionnaires was the same in all cases. The anamnestic questionnaire can be found together with the financial disclosure about the Czech version of the BDI-II in Appendix 2.

The first questionnaire examined the medical status of the participant and was supposed to help to determine whether the individual was a suitable candidate for inclusion in the final sample, i.e. whether their lacked any serious medical conditions.

The second questionnaire was the BDI-II in its Czech version by Preiss and Vacíř (1999). The process of administration is described in the theoretical part of this thesis, chapter 2.4 – Administration and Scoring.

All the questionnaires later obtained a code, total sum scores were counted and the answers to all the anamnestic and demographic questions, items of questionnaires and total sum scores were recorded into a sheet of the Excel editor, Microsoft Office package 2013.

6 Statistical Analyses

Statistical analyses were conducted by means of the programme SPSS Statistics 22 and the editor Excel from Microsoft Office package 2013. As the first step, we analysed the distribution of our data. The evaluation of data distribution was conducted by means of Shapiro-Wilk tests of normality ($p > .05$), analyses of skewness ($z < \pm 1.96$) and kurtosis ($z < \pm 1.96$) of data distribution, visual evaluation of histograms, Q-Q plots and box plots. Considering the asymmetrical data distribution and ordinal data derived from Likert-type scale further statistical analysis was performed by non-parametric statistical methods.

The mean of total sum scores of the final sample ($N = 450$) was compared with the mean of total sum scored of the participants excluded due to their medical conditions ($N = 127$) to evaluate whether the two groups were significantly different. With regard to the non-normal distribution of data according to Shapiro-Wilk tests of normality ($p < .001$), and different variance according to Levene's test ($p < .001$), we conducted this analysis by means of Mann-Whitney test. The participants excluded due to their medical conditions ($M = 8.85$) reached significantly higher total sum score than the participants with no serious medical condition ($M = 7.04$), $U = 23\ 885.5$, $z = -2.832$, $p < .001$, $r = -.12$. Therefore, further analyses were performed for the participants with no medical condition ($N = 450$) only.

The distribution of total sum scores of the selective sample ($N = 450$) is presented in the form of a histogram in Appendix 3.

Pertinent statistical analyses are presented in the Results chapter following the corresponding hypotheses and questions.

7 Results

7.1 Research Aim I.

Research hypothesis (H_0): There is no statistically significant relationship between the score in the BDI-II and gender, age and education.

To verify the research hypothesis, a non-parametric statistic was performed considering the asymmetric data distribution investigated by means of Shapiro-Wilk test ($p < .001$) and different variance in gender groups according to Levene's test ($p < .001$). According to acquired information it is clear that normal distribution of total sum scores cannot be expected in either the overall sample or the sample of participants who met the inclusion criteria for final analysis.

In order to compare the total sum scores between gender groups, non-parametric Mann-Whitney test was chosen.

In Table 7, the descriptive statistic of total sum scores of the BDI-II is presented. To clarify findings, box plots, giving information on means, interquartile range and outliers of total sum scores are provided in Figure 1.

	Women N = 244	Men N = 206
Mean (SD)	7.51 (5.93)	6.49 (5.62)
Median	5	6
Minimum	0	0
Maximum	32	31
Skewness	1.108	1.105
Kurtosis	1.446	1.501

Table 7. Descriptive statistic of total sum scores according to gender.

Note. N = number of participants in each of the groups.

SD = standard deviation.

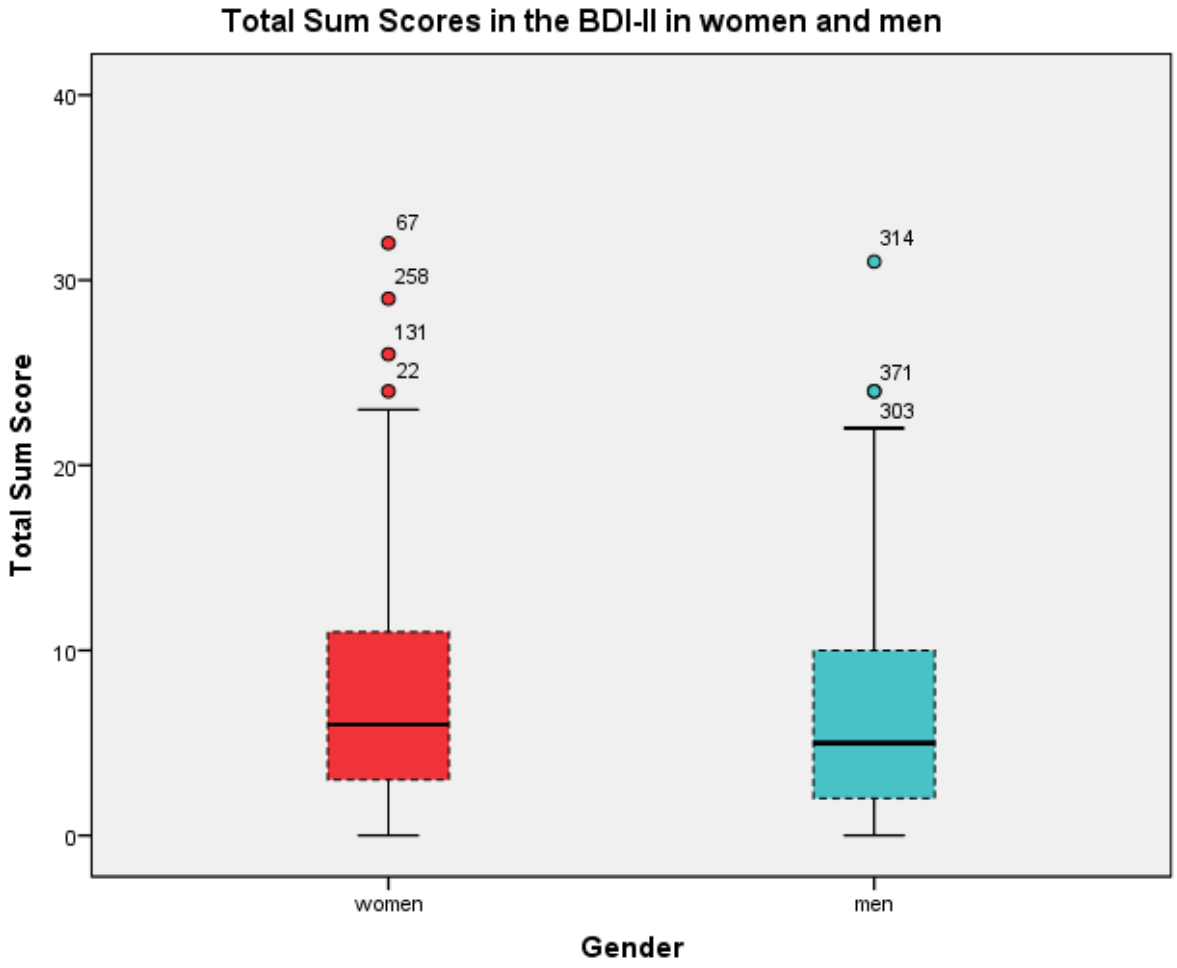

Figure 1. The comparison of total sum scores between the groups of women and men.

When comparing total sum scores between gender groups, a significant difference was found, U = 22 427.00, z = -1.97, p < .05, r = -.004.

According to presented statistical analyses, *we can reject the first part of the research hypothesis*, total sum score of the BDI-II was associated with gender in our sample.

Owing to the asymmetric data distribution investigated by means of Shapiro-Wilk test (p < .001) and different variance in age groups according to Levene's test (p < .001), a non-parametric statistic was performed to verify the second part of the research hypothesis. Spearman's correlation coefficient was counted in order to count whether there was correlation between age in years and total sum score.

In Figure 2, the distribution of means for different ages is displayed. The distribution of medians for different ages is presented in the form of a histogram in Appendix 4.

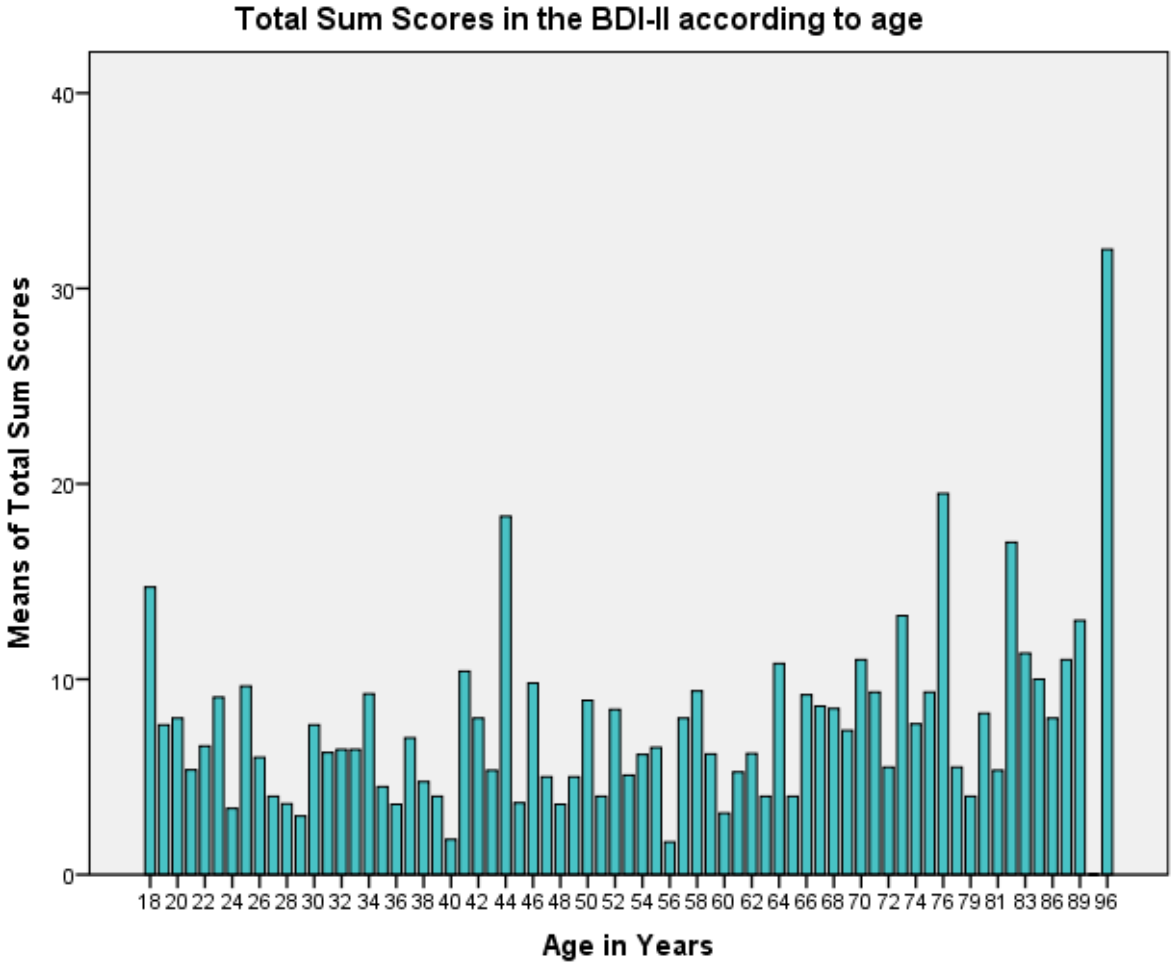

Figure 2. Means of total sum scores as distributed for different ages of participants.

When counting Spearman's correlation coefficient to discover potential relationship between age and total sum scores, no statistically significant relationship was found, $r_s = .05$, $p = .265$.

According to aforementioned statistical analyses, *we failed to reject the second part of the research hypothesis*, total sum score of the BDI-II was not influenced by age in our sample.

In order to verify the third part of the research hypothesis, a non-parametric statistic was performed, taking the asymmetric data distribution investigated by means of Shapiro-Wilk test ($p < .001$) and different variance in education groups according to Levene's test ($p < .001$) into consideration. Comparison in total sum scores among education groups was conducted by means of Spearman's correlation coefficient. To acquire better understanding of differences between groups, further analysis was performed by Mann-Whitney test.

In Table 8, descriptive statistic of total sum scores in the BDI-II for groups according to education is presented. To clarify findings, box plots, giving information on means, interquartile range and outliers of total sum scores are provided in Figure 3.

Education	Secondary N = 55	Higher N = 225	University degree N = 170
Mean (SD)	11.04 (7.70)	6.75 (5.25)	6.14 (5.29)
Median	11	6	5
Minimum	0	0	0
Maximum	32	26	24
Skewness	.857	.886	.988
Kurtosis	.577	.534	.668

Table 8. Descriptive statistic of total sum scores according to education.

Note. N = number of participants in each of the groups.

SD = standard deviation.

Secondary education = the participant completed compulsory school attendance.

Higher education = the participant completed high school and obtained a maturita exam.

University degree = the participant completed university education and obtained a degree.

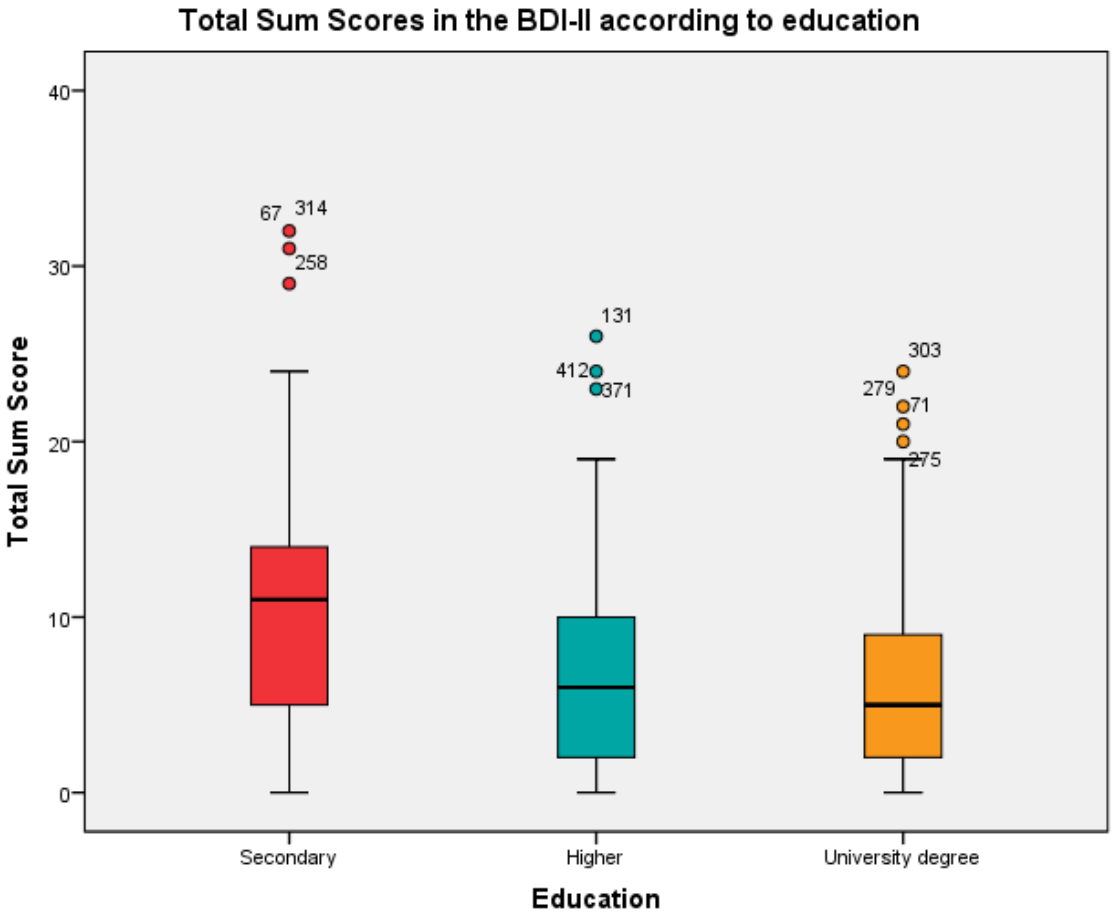

Figure 3. The comparison of total sum scores among the groups of different levels of education.
Note. Secondary education = the participant completed compulsory school attendance.
Higher education = the participant completed high school and obtained a maturita exam.
University degree = the participant completed university education and obtained a degree.

When comparing total sum scores among the groups of different levels, statistically significant relationship was found, $r_s = -.18$, $p < .001$. Further analysis revealed that total sum scores differed only in some groups of different levels of education. Table 9 shows what groups evinced a statistically significant difference.

Education	Secondary	Higher	University degree
Secondary	-	**< .001**	**< .001**
Higher	**< .001**	-	.117 (ns)
University degree	**< .001**	.117 (ns)	-

Table 9. Comparison of total sum scores among groups of different levels of education.
Note. ns = nonsignificant.
Secondary education = the participant completed compulsory school attendance.
Higher education = the participant completed high school and obtained a maturita exam.
University degree = the participant completed university education and obtained a degree.

According to the statistical analyses presented, *we can reject the third part of the research hypothesis*, total sum score of the BDI-II was associated with education in our sample.

7.2 Research Aim II.

Research question no. 1: What is the internal consistency of the BDI-II?

To indicate internal consistency of the BDI-II in our sample, Cronbach's alpha was counted by means of reliability analysis.

The Beck Depression Inventory-II has high reliability, Cronbach's $\alpha = .84$.

Research question no. 2: What are the relationships between the total score and different items of the BDI-II?

To measure how each of the items is correlated with the total sum score, reliability analysis was conducted. This internal consistency investigation may serve as an indicative evaluation of its reliability. Corrected Item-Total Correlations are reported in Table 10.

	Corrected Item-Total Correlation
Item 1 – Sadness	.441
Item 2 – Pessimism	.477
Item 3 – Past Failure	.391
Item 4 – Loss of Pleasure	.508
Item 5 – Guilty Feelings	.377
Item 6 – Punishment Feelings	.311
Item 7 – Self-Dislike	.366
Item 8 – Self-Criticalness	.462
Item 9 – Suicidal Thoughts or Wishes	**.213**
Item 10 – Crying	.365
Item 11 – Agitation	.467
Item 12 – Loss of Interest	.388
Item 13 – Indecisiveness	.507
Item 14 – Worthlessness	.410
Item 15 – Loss of Energy	.516
Item 16 – Changes in Sleeping Pattern	.410
Item 17 – Irritability	.420
Item 18 – Changes in Appetite	.302
Item 19 – Concentration Difficulty	.497
Item 20 – Tiredness or Fatigue	**.525**
Item 21 – Loss of Interest in Sex	.336

Table 10. Corrected Item-Total Correlation between each of the items and total sum scores.
Note. The lowest and the higher item-total correlations appear in bold.

The correlations between items of the Beck Depression Inventory-II and the total sum score were adequately high ($r > .3$; Field, 2009), except for one item ($r < .3$; Field, 2009): Item 9 - Suicidal Thoughts or Wishes.

Research question no. 3: What are the relationships between gender, age, and education, and different items of the BDI-II?

In order to investigate the relationships between the items of the BDI-II and gender, age and education, a non-parametric statistic was performed, taking the asymmetric data distribution investigated by means of Shapiro-Wilk test ($p < .001$) and different variance in gender, age and education groups according to Levene's test ($p < .001$) into consideration. Correlations were measured by means of Spearman's correlation coefficient. The correlations and their significances are reported in Table 11.

	Gender	Age	Education
Item 1 – Sadness	**-.10** **Sig. .044***	**-.10** **Sig. .027***	-.08 Sig. .074 (ns)
Item 2 – Pessimism	-.04 Sig. .455 (ns)	-.07 Sig. .123 (ns)	**-.10** **Sig. .039***
Item 3 – Past Failure	-.03 Sig. .470 (ns)	-.05 Sig. .284 (ns)	**-.15** **Sig. .001****
Item 4 – Loss of Pleasure	.02 Sig. .740 (ns)	.05 Sig. .258 (ns)	-.08 Sig. .101 (ns)
Item 5 – Guilty Feelings	-.05 Sig. .324 (ns)	-.08 Sig. .074 (ns)	**-.13** **Sig. .005****
Item 6 – Punishment Feelings	-.05 Sig. .325 (ns)	**-.16** **Sig. .001****	**-.14** **Sig. .002****
Item 7 – Self-Dislike	-.09 Sig. .050 (ns)	-.06 Sig. .210 (ns)	**-.11** **Sig. .018***
Item 8 – Self-Criticalness	-.05 Sig. .313 (ns)	-.01 Sig. .841 (ns)	**-.12** **Sig. .009****
Item 9 – Suicidal Thoughts or Wishes	-.01 Sig. .865 (ns)	**-.16** **Sig. .000****	**-.15** **Sig. .001****
Item 10 – Crying	**-.17** **Sig. .000****	**-.18** **Sig. .000****	**-.15** **Sig. .002****
Item 11 – Agitation	-.11 Sig. .021 (ns)	-.08 Sig. .081 (ns)	-.07 Sig. .140 (ns)
Item 12 – Loss of Interest	.03 Sig. .484 (ns)	-.04 Sig. .410 (ns)	-.07 Sig. .121 (ns)
Item 13 – Indecisiveness	-.09 Sig. .052 (ns)	**.15** **Sig. .001****	**-.21** **Sig. .000***

	Gender	Age	Education
Item 14 – Worthlessness	-.03 Sig. .467 (ns)	.05 Sig. .269 (ns)	**-.10** **Sig. .030***
Item 15 – Loss of Energy	-.01 Sig. .797 (ns)	**.29** **Sig. .000****	-.02 Sig. .660 (ns)
Item 16 – Changes in Sleeping Pattern	-.02 Sig. .669 (ns)	**.09** **Sig. .049***	**-.11** **Sig. .026***
Item 17 – Irritability	.05 Sig. .288 (ns)	-.06 Sig. .245 (ns)	-.07 Sig. .141 (ns)
Item 18 – Changes in Appetite	-.07 Sig. .122 (ns)	-.06 Sig. .245 (ns)	-.07 Sig. .143 (ns)
Item 19 – Concentration Difficulty	-.04 Sig. .456 (ns)	.04 Sig. .435 (ns)	-.07 Sig. .136 (ns)
Item 20 – Tiredness or Fatigue	-.05 Sig. .269 (ns)	**.19** **Sig. .000****	.01 Sig. .835 (ns)
Item 21 – Loss of Interest in Sex	.01 Sig. .848 (ns)	**.42** **Sig. .000****	-.00 Sig. .991 (ns)

Table 11. Correlations between each of the items of the BDI-II and gender, age and education and their significances.

Note. ns = nonsignificant.

* - Correlation significant at the 0.05 level (2-tailed).

** - Correlation significant at the 0.01 level (2-tailed).

It is possible to conclude that certain items of the Beck Depression Inventory evince a relationship with demographic characteristics, specifically gender, age and education.

Gender correlated with Item 1 – Sadness ($r_s = -.10$, $p < 0.05$) and Item 10 – Crying ($r_s = -.17$, $p < 0.01$). Women tended to endorse higher scores in these two items than men.

Age correlated with Item 1 – Sadness ($r_s = -.10$, $p < 0.05$), Item 6 – Punishment Feelings ($r_s = -.16$, $p < 0.01$), Item 9 – Suicidal Thoughts and Wishes ($r_s = -.16$, $p < 0.01$), Item 10 – Crying ($r_s = -.18$, $p < 0.01$), Item 13 – Indecisiveness ($r_s = .15$, $p < 0.01$), Item 15 – Loss of Energy ($r_s = .29$, $p < 0.01$), Item 16 – Changes in Sleep Pattern ($r_s = .09$, $p < 0.05$), Item 20 – Tiredness or Fatigue ($r_s = .19$, $p < 0.01$) and Item 21 – Loss of Interest in Sex ($r_s = .42$, $p < 0.01$). Younger participants tended to indicate higher scores in items 1, 6, 9 and 10, whereas older participants endorsed higher scores in items 13, 15, 16, 20 and 21.

Education was associated with the Item 2 – Pessimism ($r_s = -.10$, $p < 0.05$), Item 3 – Past Failure ($r_s = -.15$, $p < 0.01$), Item 5 – Guilty Feelings ($r_s = -.13$, $p < 0.01$), Item 6 – Punishment Feelings ($r_s = -.14$, $p < 0.01$), Item 7 – Self-Dislike ($r_s = -.11$, $p < 0.05$), Item 8 – Self-Criticalness ($r_s = -.12$, $p < 0.01$), Item 9 – Suicidal Thoughts and Wishes ($r_s = -.15$, $p < 0.01$), Item 10 – Crying ($r_s = -.15$, $p < 0.01$), Item 13 – Indecisiveness ($r_s = -.21$, $p < 0.01$), Item 14 – Worthlessness ($r_s = -.10$, $p < 0.05$) and Item 16 – Changes in Sleeping Pattern ($r_s = -.11$, $p < 0.05$). Participants with lower education tended to report higher scores in Items 2, 3, 5, 6, 7, 8, 9, 10, 13, 14 and 16.

7.3 Research Aim III.

Research question no. 4: How does the mean, standard deviation, range, and factorial structure of Czech data differ from data in foreign studies?

In order to investigate the mean, standard deviation, and range, descriptive statistical analyses were performed. The results are reported in Table 12.

	Czech sample N = 450
Mean	7.04
Standard deviation	5.81
Variance	33.711
Range	0 - 32
Cronbach's alpha	.84

Table 12. Descriptive statistic and psychometric properties of the whole Czech sample, N = 450.

Descriptive statistics and psychometric properties of the BDI-II investigated in the original study by Beck and his colleagues (1996) as well as validation studies adapting the instrument for different language and culturally-specific groups, were presented in the theoretical part of this thesis, namely in the chapters 2.5 – Differential Mean Scores in the BDI-II Dependent on Country of Origin and Other Socio-Demographic Factors, 2.6 –

Reliability and 2.7 – Validity. The Table 2 and Table 4 summarise the descriptive data, which will be compared to our sample. Only studies with samples comparable to our sample, i.e. non-clinical samples, are included. The only exception is the Croatian validation study (Jakšić et al., 2013), which was conducted with medical care outpatients. The studies are presented in an order reflecting their geographical location.

To compare the mean of the Czech sample with the foreign data, the means of the different studies as well as their confidence intervals were investigated. The confidence intervals, appearing as error bars in the figure, were counted using the number of participants in the sample and the standard deviation reported in the studies. The results may be observed in Figure 4.

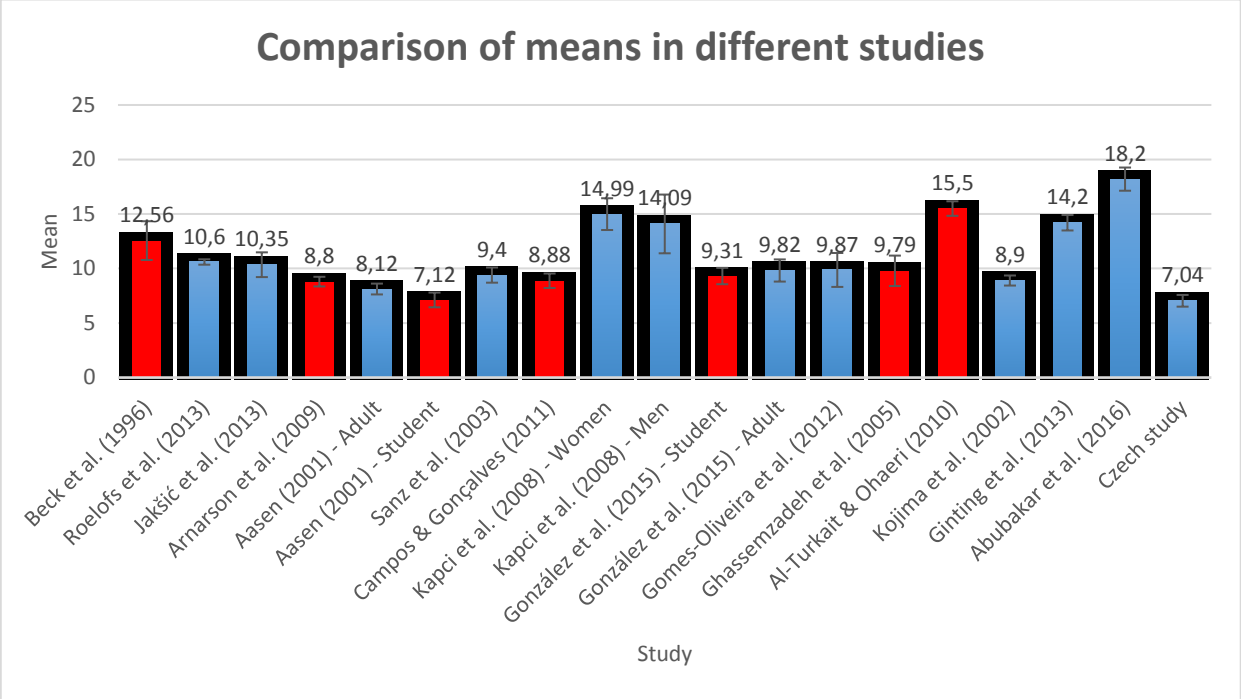

Figure 4. Comparison of means in different studies with error bars.

Note. Red colour = Student samples.

Blue colour = Adult samples.

When comparing the means and confidence intervals of foreign studies and the Czech study, it may be observed that Czech participants scored significantly lower than participants in other studies, since the error bars, signifying 95% confidence intervals, are not overlapping with any of the other studies.

The range of their answers was also narrower (0-32 vs. 0-62 or 0-51) than ranges reported in other studies.

Cronbach's alpha of the Czech study was slightly lower than alphas observed in other studies, the only lower alpha was observed for the Arabic version by Al-Turkait and Ohaeri (2010). Nevertheless, the internal consistency of the Czech version (.84) was comparable to foreign studies.

To compare factorial structure of the Czech data to the data of foreign studies, exploratory factor analysis was conducted given the contradictory results of different studies. Intercorrelations among the 21 BDI-II items were calculated from the responses of the sample (N = 450). The intercorrelation matrix is provided in Table 13.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
1	1																				
2	.29	1																			
3	.23	.37	1																		
4	.35	.32	.18	1																	
5	.24	.22	.38	.13	1																
6	.21	.36	.27	.24	.20	1															
7	.32	.26	.28	.18	.21	.22	1														
8	.22	.31	.29	.23	.30	.20	.28	1													
9	.11	.19	.15	.15	.09	.34	.15	.09	1												
10	.34	.15	.15	.12	.20	.18	.18	.13	.09	1											
11	.28	.34	.18	.35	.20	.10	.17	.26	.04	.24	1										
12	.19	.19	.16	.32	.16	.06	.14	.15	.16	.27	.19	1									
13	.13	.28	.25	.27	.28	.16	.13	.35	.20	.25	.33	.30	1								
14	.26	.26	.24	.25	.17	.25	.41	.25	.20	.16	.12	.14	.20	1							
15	.26	.25	.14	.41	.14	.05	.18	.18	-.02	.19	.27	.26	.30	.22	1						
16	.13	.15	.16	.25	.16	.12	.03	.22	.02	.19	.23	.20	.23	.12	.39	1					
17	.34	.20	.12	.34	.18	.14	.16	.22	.10	.20	.34	.22	.21	.10	.28	.23	1				
18	.14	.10	.12	.11	.18	.06	.08	.19	.06	.19	.13	.16	.21	.10	.16	.21	.17	1			
19	.23	.20	.13	.30	.12	.14	.22	.20	.13	.26	.35	.32	.36	.33	.34	.25	.26	.17	1		
20	.23	.24	.12	.34	.17	.12	.17	.29	-.02	.16	.30	.20	.25	.27	.56	.36	.28	.17	.39	1	
21	.07	.13	.05	.22	.07	-.00	.07	.17	-.00	.09	.19	.15	.24	.15	.36	.25	.15	.25	.22	.35	1

Table 13. Correlations among the items of the BDI-II.

A principal axis factoring (PAF) was conducted on the 21 items with oblique rotation (direct oblimin), since a relationship may be predicted among the factors (Field, 2009). Some authors (Abubakar et al., 2016) suggested that a single factor model may be the best solution for results of the BDI-II, and others (Arnau, Meagher, Norris, & Bramson, 2001) argue that regardless of the number of factors, all items tend to tap into a second-order construct of depression. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .862 ("great" according to Hutcheson and Sofroniou, 1999), and all KMO values for individual items were >.74, which is well above the acceptable limit of .5 (Field, 2009). Bartlett's test of sphericity χ^2 (210) = 2109.89, $p < .001$, indicated that correlations between items were sufficiently large for PAF.

An initial analysis was run to obtain eigenvalues for each component in the data. Six components had eigenvalues over Kaiser's (1960) criterion of 1 and in combination explained 38.21% of the variance. Nevertheless, this criterion is, according to Field (2009) accurate only when there are less than 30 variables and communalities after extraction are greater than .7 or when the sample size exceeds 250 and the average communality is greater than .6. Although the number of variables counted was smaller than 30 (i.e. 21) and the sample size exceeded 250 (i.e. 450), the communalities after extraction ranged from .16 to .56 and the average communality was .38. In addition, Kaiser's criterion tends to overestimate the number of factors (Field, 2009).

Therefore, another analysis was conducted according to the number of factors derived from the scree plot. The scree plot may be observed in the Appendix 5. According to Cattell (1966), the cut-off point should be at the point of inflexion of the curve of the scree plot. Field (2009) also recommended not including the point of inflexion into the analysis. Given the acceptable sample size, and the convergence of the scree plot and results of previous research on two components (e.g. Beck, Steer & Brown, 1996; Campos and Gonçalves, 2011; Sanz et al., 2003), this is the number of components that were retained in the final analysis. These two factors explained 27.12% of the variance.

It may be observed in Table 14 that the BDI-II is consisted of two moderately intercorrelated factors (r = .44). Table 14 summarises information from the structure matrix. Results provided by the pattern matrix may be observed in the Appendix 6.

The items that cluster on the component 1 (i.e. items 4 – Loss of Pleasure, 11 – Agitation, 12 – Loss of Interest, 15 – Loss of Energy, 16 – Changes in Sleeping Pattern, 17 – Irritability, 19 – Concentration Difficulty, 20 – Tiredness or Fatigue and 21 – Loss of Interest in Sex) suggested that this component may be considered to represent a somatic factor, with the highest loading for the Item 15 – Loss of Energy (.704) and for the Item 20 – Tiredness or Fatigue (.671).

The component 2 may be considered to reflect a cognitive-affective factor based on the loading items (i.e. items 1 – Sadness, 2 – Pessimism, 3 – Past Failure, 5 – Guilty Feelings, 6 – Punishment Feelings, 7 – Self-Dislike, 8 – Self-Criticalness, 14 – Worthlessness). The highest loadings on this factor were the Item 6 – Pessimism (.563) and the Item 3 – Past Failure (.553).

Three items, namely Item 9 – Suicidal Thoughts and Wishes, Item 10 – Crying and Item 18 – Changes in Appetite, did not load saliently to any of the two components. One item, Item 13 – Indecisiveness, loaded on both the factors.

	Rotated Factor Loadings	
Item	Factor 1	Factor 2
1. Sadness	.391	**.483**
2. Pessimism	.377	**.548**
3. Past Failure	.245	**.553**
4. Loss of Pleasure	**.546**	.396
5. Guilty Feelings	.276	**.449**
6. Punishment Feelings	.160	**.534**
7. Self-Dislike	.255	**.508**
8. Self-Criticalness	.393	**.464**
9. Suicidal Thoughts or Wishes	.074	.377
10. Crying	.339	.344
11. Agitation	**.508**	.356
12. Loss of Interest	**.417**	.291
13. Indecisiveness	**.494**	**.408**
14. Worthlessness	.329	**.476**
15. Loss of Energy	**.704**	.208
16. Changes in Sleeping Pattern	**.507**	.184
17. Irritability	**.461**	.314
18. Changes in Appetite	.317	.189
19. Concentration Difficulty	**.557**	.345
20. Tiredness or Fatigue	**.671**	.241
21. Loss of Interest in Sex	**.471**	.082
Eigenvalues	5.25	1.84
% of variance	21.67	5.45
α	.79	.74

Table 14. Summary of exploratory factor analysis results for the BDI-II in Czech population (N = 450).

Note. Factor loadings over .40 appear in bold.

In order to compare the factor structure in Czech data and in foreign studies, Table 5 in the theoretical part of this thesis, namely in the chapter 2.7 – Validity, summarises the results of previous factor analyses in validation studies.

When comparing the Czech factor analysis and the Beck, Steer and Brown's (1996) analysis, whereas in the Czech data, Item 9 – Suicidal Thoughts or Wishes, Item 10 – Crying and Item 18 – Changes in Appetite did not load to any of the factors, in the Beck et al.'s study the first two items loaded on the cognitive-affective factor and the third loaded on the somatic factor. Item 2 – Pessimism and Item 21 – Loss of Interest in Sex, which did not load to any of the factors in the study by Beck et al., on the other hand, loaded to the cognitive-affective and the somatic factor with considerably high loadings, .548 and .471, respectively. More items, namely Item 4 – Loss of Pleasure, Item 11 – Agitation, Item 12 – Loss of Interest and Item 17 – Irritability, loaded on the somatic factor in the Czech study, than in the original study. Item 13 – Indecisiveness, which loaded in the Beck et al.'s study to the cognitive-affective factor, loaded to both the factors in the Czech study.

8 Normative Standards

Owing to the aforementioned results connected to the association between education and the total sum score in the BDI-II, the education groups were re-defined in order to develop norms for the Czech population with regard to education. Instead of the original three education groups, new groups were defined. Participants who completed higher and university education were united into one group, since the analysis did not reveal a statistically significant difference between their results in the BDI-II. The second group was formed by participants who completed secondary education. In terms of education two groups were therefore created: participants with lower (i.e. secondary) and higher (i.e. higher and university) education.

Considering the results revealing the relationship between the total sum scores in the BDI-II and gender, original pre-defined groups, women and men, were used to develop norms for the Czech population.

Owing to a nonsignificant difference in total sum scores in the BDI-II according to age, the development of norms did not take this demographic characteristic into account.

During the process of developing norms the total sum scores were transformed into standard z-scores, whose basic characteristic is the mean of $m_z = 0$ and the standard deviation of $s_z = 1$. The transformation is possible by means of McCall area normalisation (Říčan, 1977). From the original asymmetric distribution of the total sum scores, the normal distribution of standard scores was derived. Detailed summary of our McCall area transformation for both the whole sample and according to groups conducted for the needs of this thesis may be observed in Appendices 7 through 11.

Measures of central tendency and standard deviations for the BDI-II for the whole sample together with results in percentiles may be observed in Table 15. The results in percentiles for groups according to gender and education may be found in Appendix 12. Percentiles were chosen to describe normative data, since they allow the same interpretation, no matter if the data are normally distributed or skewed. In addition, standardised T-scores, stens and stanines are presented, as they allow a comparison of score in the BDI-II with scores in other tests which were standardised for the same scores. T-scores were chosen as standardised score srecommended by the American Psychological Association (APA) for the development of norms for psychological tests (Urbánek, Denglerová, & Širůček, 2011), the results in T-scores for both the whole sample and groups according to gender and education may be hence found in Appendices 13 and 14.

Distribution of scores	
Mean (SD)	7.04 (5.806)
Median	6
Percentiles	
> 99	> 27
90–99	15-26
80-89	12-14
70-79	10-11
60-69	8-9
50-59	6-7
40-49	5
30-39	4
20-29	2-3
10-19	1
< 10	0

Table 15. Normative data (percentiles) for the BDI-II – Czech version for the whole sample.

9 Discussion

9.1 Research Aim I.

The first aim of this thesis was to provide normative data for the BDI-II based on data obtained from a sample of 450 both physically and mentally healthy individuals from 18 to 96 years. Prior to the development of normative standards, it was necessary to investigate whether three fundamental demographic characteristics (gender, age and education) influence the total sum scores obtained in the inventory and hence whether the normative data should be developed without the contribution of these variables to the total score.

In sum, the contribution of gender, age and three groups of levels of education (secondary, higher and university) to the total sum scores were analysed. The results suggest that there was a significant relationship between gender and total sum scores as well as education and total sum scores, but no association between age and total sum scores. Normative data for the BDI-II were then developed according to gender and education for the groups, where significant differences were investigated.

9.1.1 The Contribution of Gender

According to our analyses, total sum scores in the BDI-II is significantly related to gender with women scoring higher than men. This result is consistent with previous research, which report higher scores endorsed by women than men (Aasen, 2001; Al-Turkait & Ohaeri, 2010; Beck, Steer, & Brown, 1996; Campos & Gonçalves, 2011; Gomes-Oliveira et al., 2012; González et al., 2015; Kojima et al., 2002; Roelofs et al., 2013; Sanz et al., 2003). This result is also in accordance with the fact that depression and depressive symptoms are more often reported in women than men in general (American Psychiatric Association, 2013) as well as in the Czech Republic (Daňková, 2011), as mentioned in the chapter 1.5 – Development and Differential Diagnosis. In particular, women endorsed higher scores in two items, namely Item 1 – Sadness and Item 10 – Crying.

On the other hand, some authors (Aasen, 2001; Ghassemzadeh et al., 2005; Jakšić et al., 2013; Kapci et al., 2008) did not find any relationship between scores of men and women in data from their samples or a part of their sample. This may be explained by a different nature of their samples, which contained students (Aasen, 2001; Ghassemzadeh et al., 2005) or medical care patients (Jakšić et al., 2013) and by unbalanced number of participants in groups according to gender in their samples (Kapci et al., 2008), as may be observed in Table 2. In the present sample, the number of men and women was balanced, as can be seen in Table 6.

Based on the results of our prior analyses we decided to normative data separately for men and women.

9.1.2 The Contribution of Age

Concerning the contribution of age to BDI-II total score, the analyses did not reveal any significant relationship. These results are consistent with results of other normative and validation studies (Ghassemzadeh et al., 2005; González et al., 2015; Kojima et al., 2002; Roelofs et al., 2013).

Although some authors reported correlation between age and total sum scores, their samples were often of a different nature. Beck, Steer, and Brown (1996), who reported that age was inversely correlated with total sum scores, investigated this relationship with a student sample, whose age range was considerably narrower than ours (M = 19.58, SD = 1.84). Jakšić et al. (2013), on the other hand, who reported a positive correlation between age and total sum scores, used a medical outpatient sample (M = 55.01, SD = 12.99), whereas our inclusion criteria were rather strict in terms of medical conditions. On the contrary, the adult sample used by Sanz et al. (2003), where a positive correlation between age and total score was also observed, was similar to the one used for the aims of this thesis in terms of nature and size, as may be observed in Table 2 and Table 6.

It should be nonetheless pointed out, that in the sample of this thesis, not all the age groups were balanced in terms of the number of participants. Whereas groups involving participants at the age of 30 and older consisted of considerably similar number of participants, the group of participants below 30 embraced a noticeably higher number of participants (see Table 6).

In particular, detailed analyses revealed correlations between age and scores endorsed for certain items. Older participants tended to score more in five items, namely Item 13 – Indecisiveness, Item 15 – Loss of Energy, Item 16 – Changes in Sleep Pattern, Item 20 – Tiredness or Fatigue and Item 21 – Loss of Interest in Sex. Younger participants scored higher in four items, concretely Item 1 – Sadness, Item 6 – Punishment Feelings, Item 9 – Suicidal Thoughts or Wishes and Item 10 – Crying.

Nevertheless, age because of non-significant association with the total BDI-II score was not further included in the development of normative data.

9.1.3 The Contribution of Education

Regarding the influence of education, the sample was originally divided into three groups according to the highest level of education the participant completed (secondary = the participant completed compulsory school attendance, higher = the participant completed high school and obtained a maturita exam and university degree = the participant completed university education and obtained a degree), which is consistent with previous research investigating relationship between total sum scores in the BDI-II and education (Jakšić et al., 2013, Roelofs et al., 2013; Sanz et al., 2003). The analyses revealed no significant difference between total sum scores of participants with higher education or university degree, so these two groups were merged together. Regarding the relationship between education and total sum scores, two groups according to education were created (secondary = the participant completed compulsory school attendance and higher = the participant completed high school and obtained a maturita exam) and included in the development of normative data.

Total sum scores in the BDI-II correlated significantly with the bifurcated level of education the participant completed. The correlation was negative, hence participants with lower education tended to score higher in the inventory and vice versa. Not only did they score higher in the whole inventory on average, they also scored significantly higher in a number of items, namely Item 2 – Pessimism, Item 3 – Past Failure, Item 5 – Guilty Feelings, Item 6 – Punishment Feelings, Item 7 – Self-Dislike, Item 8 – Self-Criticalness, Item 9 – Suicidal Thoughts or Wishes, Item 10 – Crying, Item 13 – Indecisiveness, Item 14 – Worthlessness and Item 16 – Changes in Sleeping Pattern.

These results are consistent with previous research from Croatia, the Netherlands and Spain (Jakšić et al., 2013, Roelofs et al., 2013; Sanz et al., 2003). It is important to mention, however, that in the sample of the present thesis, the number of participants who completed secondary education only was considerably smaller than the number in other groups (see Table 6), which might have influenced the results.

9.1.4 Normative Standards

According to the normative data a trend that the total sum score decreases with education and is higher for women may be observed (see Tables 7 through 9). In the present sample, a steep drop in score frequencies may also be observed in high scores irrespective of gender or education, approximately at the total sum score of 20 (see Appendices 7 through 11). Percentile data (in Table 15 and Appendix 12) show high frequencies in lower total sum scores and we believe that the differential potential of the BDI-II is optimal at these levels. It may be observed

that more than three-quarters of the sample of this thesis, which consisted of both physically and mentally healthy participants, scored in the interval, which would Beck, Steer, and Brown (1996) consider "no depressive symptoms". On the other hand, it is important to point out that only 10% of participants endorsed the score of 0 on the scale.

Several important conclusions may be made as based on our previous analyses of the normative data. First, most of our participants endorsed some depressive symptoms on a certain level, although they scored in the interval, which was considered without depressive symptoms by Beck, Steer and Brown (1996). This is consistent with the assumption that scores in the BDI-II have a skewed distribution in most of the samples, with non-clinical samples endorsing the lowest scores possible (Wang & Gorenstein, 2013b), which was similar in previous research (Roelofs et al., 2013).

In addition, it is important to mention that despite the relationship between gender, education and total sum scores, variability may be observed in different single items being endorsed differentially by certain demographically stratified participants. Not only are some symptoms more prevalent according to certain demographic characteristics (American Psychiatric Association, 2013), but the analyses in this thesis confirmed association between some single items and demographic variables, which is consistent with previous research (e.g. Campos & Gonçalves, 2011). In conclusion, these results should be taken into consideration when using the normative data in research or in clinical practice.

Furthermore, precautions should be taken when deciding about a possible cut-off point. This decision is based mainly on the purpose of the utilisation of the test. If the examiner wishes to detect a maximum number of participants with depression, the cut-off point must be lowered to minimalise the number of false negatives. If the purpose is to obtain as clear diagnostics of depression as possible, the cut-off point should be raised in order to minimalise the number of false positives (Beck, Steer, & Brown, 1996). Moreover, the interpretation of this cut-off must be consistent with clinical consideration since the personal burden may be perceived differently than the test results indicate (Roelofs et al., 2013).

The BDI-II or its normative data presented in this thesis must not become the only the only instrument for depression diagnostics (Beck, Steer, & Brown, 1996). The diagnose must be based on clinical evaluation and only the evaluation of its severity is not sufficient. Further investigation into comorbidity, functioning and motivation for treatment is thus needed (Roelofs et al., 2013). Normative data, presented in this thesis, are therefore a means to indicate the position of the respondent in a non-clinical population.

9.2 Research Aim II.

The second aim of the thesis was to evaluate certain psychometric properties of the instrument, namely the internal consistency, item-total correlations and correlations of different items and demographic characteristics.

9.2.1 Internal Consistency

Internal consistency reported in this thesis, $\alpha = .84$, is slightly lower than the one reported in previous research (e.g. Beck, Steer, & Brown, 1996; Gomes-Oliveira et al., 2012; Roelofs et al., 2013), but comparable to alphas reported in some studies (Al-Turkait & Ohaeri, 2010) and to alphas observed in previous versions of the instrument (Beck, Steer, & Brown, 1996).

The reason for this results may the abovementioned nature and size of the sample as well as its differences in comparison to samples in previous research, which often included student samples (e.g. Arnarson et al., 2009; Beck et al., 1996; Campos & Gonçalves, 2011). It was observed that the Cronbach's alpha may vary considerably within samples in the same language version, for example in the Indonesian study with a non-clinical, coronary heart disease and psychiatric sample by Ginting et al. (2013).

9.2.2 Relationship between Items and Total Sum Score

Each of the BDI-II items was correlated with the total sum score in order to find out what association could be find in this matter. Some low correlations between items and total sum score could be observed. One item, namely Item 9 – Suicidal Thoughts or Wishes, revealed a correlation of $r < .3$, which could cause its exclusion according to Field (2009). This result is consistent to the Mexican study with a student sample (González et al., 2015), who observed that the lowest item-total correlation was in Item 9. In their study, however, the correlation reached more than $r = .3$. The highest item-total correlation was observed in Item 20 – Tiredness or Fatigue, which is consistent with previous research by Jakšić et al. (2013).

Beck, Steer, and Brown (1996) nonetheless recommends to dedicate special attention to Item 9 – Suicidal Thoughts or Wishes, since its endorsement may signify a higher risk of suicide, which is the most common cause of death in individuals with depression (American Psychiatric Association, 2013). Therefore, it would be preferable to keep the item as a part of the questionnaire for further qualitative and clinical evaluation of the respondent's responses.

Furthermore, it is essential to point out that the present sample consisted only of non-clinical participants, who had no psychiatric diagnoses or somatic complaints. Therefore,

the item evinces a very low variability in the present sample, with 425 participants endorsing 0, 24 endorsing 1 and only one marking 2. The results might nonetheless be different in a clinical sample and especially in individuals diagnosed with affective disorders.

9.2.3 Relationship between Items and Demographic Variables

An association was found between some of the BDI-II items and demographic variables, namely gender, age and education. As may be observed in Table 11, gender correlated with two items of the questionnaire with women scoring significantly higher than men, age was connected to nine items, out of which four were correlated negatively and five positively, and education was associated with eleven items, with participants with lower education scoring higher in all of them.

As it was observed in clinical practices with symptoms of depression (American Psychiatric Association, 2013) as well as during research of the BDI-II (e.g. Campos & Gonçalves, 2011), some items evince a higher association with certain demographic variables than other. Therefore, the results of this study are in accordance with previous research and give an overview of the associations specifically for the sample of the thesis.

9.3 Research Aim III.

The third aim of this thesis was to investigate the factorial structure of the inventory. Some of the psychometric properties, i.e. the mean, range, Cronbach's alpha and the factorial structure, were then compared with results of previous studies.

Comparison of the mean of total sum scores in the Czech study and other mentioned validation studies was provided. According to the analysis described in Figure 4, the Czech sample differed significantly from all the other studied samples, scoring significantly lower. At this point, it may be concluded that the increased mean score in the sample of young Czech soldiers studied with the BDI-II, observed by Preiss and Vacíř (1999), might not have been influenced by the Czech translation, but rather the nature of their sample. It is therefore essential to point out that the level of strictness while choosing the inclusion criteria for sampling may influence the mean score in the BDI-II of the sample.

Again, this may be caused by the nature of the sample of this thesis, especially in terms of strict inclusion criteria, which none of the other authors of previous research describe. Therefore, it is possible that the participants in the study of this thesis evinced a lower percentage of medical conditions influencing their mood than participants of different studies.

In addition, a number of compared studies (e.g. Al-Turkait & Ohaeri; 2010; Arnarson et al., 2009; Beck, Steer, & Brown,1996) tested student samples. In this matter, students may evince a higher score than the overall population under certain circumstances. Al-Turkait and Ohaeri (2010), for example, reported that their sample scored significantly higher than samples in other studies.

Furthermore, the number of participants with completed secondary education was much smaller than the number of participants with completed higher or university education. According to the aforementioned analyses, lower education correlated with higher scores. It is therefore important to point out that lower scores in the Czech sample may be connected to insufficient number of participants with lower education, or at least smaller percentage than in other studies.

Similarly, the number of participants in older groups was rather smaller than the number of participants in younger groups, especially between the age of 18 and 30. In spite of the fact that there was no association between age and total sum scores in our sample, some authors (Jakšić et al., 2013; Sanz et al., 2003) reported that older participants tended to endorse higher scores in the BDI-II than younger participants. Therefore, this lower mean score may also be influenced by unbalanced number of participants in the age groups of the study of this thesis.

All self-report inventories yield to response bias, some individuals may evince more symptoms than they experience, others may deny some (Arbisi, 2001). In this respect, the high face validity of the BDI-II may represent a drawback (Gottfried, 2015) as the respondents may tend to rate the symptoms in a malingering and deceitful way (Seignourel, Green, & Schmitz, 2008). It may hence be possible that in the sample of our thesis, a higher percentage of participants tended to deny or did not have sufficient level of introspection to acknowledge their depressive symptoms. In addition, the fact that the questionnaire was assigned by means of pencil-and-paper method may also influence the participants to deny some symptoms while facing the examiner.

This difference may also be caused by cultural specifics, since in different cultures depressive symptoms may be described in different terms or represent a different nature of a personal burden, as depicted in the chapter 2.5 – Differential Mean Scores in the BDI-II Dependent on the Country of Origin and Other Socio-Demographic Factors. The participants from different countries may thus differ in test-taking behaviour (van de Vijver, 2002).

The results of the factor analysis in this thesis are comparable to results of a number of previous studies, including the original manual (Beck, Steer, & Brown, 1996). Even though three of the items did not load to any of the factors and one item loaded on both of them, the

structure still gives a clear overview of the factorial structure of the data obtained from our sample and the factors derived – a somatic and a cognitive-affective one – have a similar nature to previous studies (Abubakar et al., 2016; Al-Turkait & Ohaeri, 2010; Beck, Steer, & Brown, 1996; Campos & Gonçalves, 2011; Ghassemzadeh et al., 2005; Sanz et al., 2003), as it is apparent from Table 5. The most striking difference lies in the fact that the largest part of the variance (i.e. 21.67%) was explained by the somatic factor, which is the second factor in most of the studies. It should be however mentioned that this structure is not exhaustive for the sample of this thesis, since these two factors explained only 27.12% of the variance, although they intercorrelated moderately.

This may be caused by the nature of our sample or a chosen method of analysis. As mentioned in the chapter 7.3 – Research Aim III., six components had eigenvalues over Kaiser's (1960) criterion of 1, which would explain 38.21% of the variance. Field (2009) however recommends deriving the number of factors from the scree plot or a theory, if certain conditions, mentioned in the results section, are met. Therefore, two factors were derived according to the scree plot, which may be observed in Appendix 5.

In addition, instead of exploratory factor analysis, confirmatory factor analysis might have been chosen as in some of previous studies (e.g. Aasen, 2001; Arnarson et al., 2009; González et al., 2015). Nonetheless, given contradictory results in previous research (e.g. Aasen, 2001; Abubakar et al. 2016; Beck, Steer, & Brown, 1996), it may be concluded that exploratory factor analysis would provide more information on the nature of data derived from the sample of the thesis and differences in comparison to previous research than confirmatory factor analysis.

Futhermore, an orthogonal rotation may have been chosen for the analysis. According to Field (2009), however, an oblique rotation is convenient when the factors are expected to be correlated. Given the results of previous studies suggesting moderately to strongly intercorrelated factors (e.g. Beck, Steer, & Brown, 1996; Ghassemzadeh et al., 2005; Kojima et al., 2002) as well as some authors suggesting a higher-order general depression dimension (Wang & Gorenstein, 2013b) or single construct interpretation (Brouwer et al., 2013b), it may be anticipated that correlations between the factors exist. Hence, an oblique rotation may be considered as the right solution while conducting factor analysis with the BDI-II.

9.4 Limitations

The results of this study have a range of limitations. The participants were chosen according to strict criteria, trying to eliminate respondents with a psychiatric or neurological

disorder as well as participants, whose medical condition might increase the score in depression self-report measures. Whether a participant was or was not included in the final analyses, however, was not based on medical history-taking, but only on self-report anamnestic questionnaire. It is hence possible that some of the participants did not report all their conditions, which may be caused by not remembering them, not considering them important regarding the aim of research or not being willing to admit them, especially since the questionnaires were filled in by means of a pencil-and-paper method of assessment and they thus had to face the examiner while filling them in. Therefore, a more detailed examination, particularly of possible psychiatric, neurodegenerative or serious somatic conditions might help to detect individuals with mood disorders or conditions causing affective difficulties in our sample. A similar examination would nonetheless be very demanding, in terms of time, finance and staff. Our criteria, however, seem to be sufficient for data development, even in comparison to other studies (e.g. Jakšić et al., 2013, Roelofs et al., 2013; Sanz et al., 2003).

On the contrary, the strict inclusion criteria used in this study may also decrease ecological validity. It is useful to point out that in the population there is a number of individuals with conditions, which caused exclusion of a participant before further analyses in this study. Hence, the normative data provided in this study should mainly indicate a direction for further examination of the respondent and their position in a healthy population, free of possible conditions complicating the affective state.

In addition, the sample of this study was not representative to the Czech population. As may be observed in Table 6, the sample was not balanced in terms of age or education. The reason for this was the fact that although the participants were recruited on the basis of quota and voluntary response sampling with taking three demographic variables – gender, age and education – into account, further recruitment was conducted via snowball sampling technique, thus recruitment in cooperation with the participants and their social network. Therefore, not all groups of participants were as attainable as other. The cross-sectional nature of the study may be also influenced by a number of disadvantages, such as differences between cohorts as well as individual characteristics of the participants (Hendl, 2015).

Furthermore, despite the fact that the participants came from all 14 regions of the Czech Republic, the majority lived in Prague and surroundings. By contrast, none of the mentioned validation studies focused on geographic origins of their participants and to our best knowledge, there is no evidence suggesting differences in depression rates in different regions of the Czech Republic.

Not all the data were collected by the same examiner. A part was collected by students of psychology at the Prague College of Psychosocial Studies, which allowed the author access a higher number of participants as well as participants from various regions and socio-economic backgrounds and thus provide higher quality of normative standards. Therefore, the results of the study might have been affected by different administration processes. Nonetheless, the students were properly trained in the administration, they filled the questionnaires in themselves and were informed what difficulties may have appeared. In addition, the administration was rather straightforward, since all the instructions were printed at the beginning of the questionnaires and in the informed consent. To keep the administration as similar as possible, all the participants filled the questionnaires by means of a pencil-and-paper method.

During the statistical analyses, a lot of outliers had to be dealt with, as can be observed in the chapter 7 – Results. This may be explained by the aforementioned variability according to different items. In addition, the BDI-II reflects only past 2 weeks, which may be influenced by a wide range of external factors (e.g. not serious and temporary medical conditions, occupational stress, relationship difficulties) not considered in the questionnaire nor the anamnestic questionnaire, especially because of the high number of somatic items present in the questionnaire.

Given the non-normal distribution, non-parametrical tests were widely used in the study. Non-parametrical tests are often considered less powerful in comparison to parametric tests, thus having an increased chance of a Type II error (i.e. more chance of concluding that no difference between groups exists despite of the fact that such a difference exists), their soundness is in this case balanced by non-normal data distribution (Field, 2009), as well as higher amount of data of both the overall sample and the sample after exclusion (N = 577; N = 450, respectively).

Another limitation of the study may be the fact that the scores may have been influenced by other factors, which were not investigated. As Sanz et al. (2003) argued, the scores may be influenced by civil status, which was not tested in our sample. Moreover, the concept of depression as well as personal burden of depressive symptoms differ throughout cultures and countries (American Psychiatric Association, 2000) and in some of them, the BDI-II must have been adjusted in terms of items formulation and form of assignment (Abubakar et al., 2016). Nonetheless, in the Czech Republic it may be anticipated that the formulation or assignment can be similar to the original, although the results may differ due to reasons of history and nature of the society (Jakšić et al., 2013). Despite of the fact that the study was not focused on geographical data, the participants came from all 14 regions of the Czech Republic, although

the majority was from Prague and surroundings. Hence, it may be concluded that geographical variables should not play an important role in the results.

Finally, there are certain limitations of the instrument itself. The BDI-II tends to overvalue depression in people with anxiety (Gottfried, 2015), chronic fatigue syndrome (Brown, Kaplan, & Jason, 2012), obesity (Hayden, Dixon, Dixon, & O'Brien, 2010), Huntington disease (Rickards et al., 2011) or hepatitis C (Patterson et al., 2011), because of its convergent validity with tools measuring anxiety (Wang & Gorenstein, 2013b) as well as similarity between somatic conditions and depressive symptoms (Gottfried, 2015).

Its coverage seems broader than description of major depression in the DSM-IV. The range of depressive symptoms was created according to well-known depressive symptoms, although its design based on diagnostic process of the DSM-IV might engender a decrease of sensitivity to certain symptoms of depression and thus reducing content validity. Moreover, since the BDI-II was not created based on a theoretical approach, the understanding of the results may be complicated from both a psychometric and a clinical point of view (Wang & Gorenstein, 2013b).

Furthermore, despite its sound psychometric properties, the samples, which were used to generate the cut-off points of the BDI-II, were unrepresentative in terms of racial make-up, patient setting and geographic distribution, and many aspects remained unmentioned. In addition, the normal sample of the manual was a student sample chosen at one university only (Farmer, 2001). Most validation studies were not conducted on the item level and were only analysed by means of classic test theory, which overlooks the measurement error and the fact that two respondents may differ in the severity of their disorder as well as frequency of the symptoms. Thus, they may reach the same total score. Error is then assumed to be normally distributed and hence not correlated with the true score. Therefore, further analyses by means of item response theory measuring the item difficulty and discrimination and discovering latent trait models, which produce the test performance, are needed, since they can address several psychometric questions at the item level beyond the summed score of classic test theory and especially beyond that provided by the present factor analysis (Wang & Gorenstein, 2013b).

Another caveat of the measure is the fact that it is copyrighted and must be purchased by the publisher. The possibilities of its research and clinical use are economically limited (Wang & Gorenstein, 2013b).

9.5 Recommendations

Despite its aforementioned drawbacks, the BDI-II is a method straightforward, easy to administer, cost-effective, useful for clinical practice and research (Wang & Gorenstein, 2013b) and reliable in evaluating the level depression severity (Lahlou-Laforêt et al., 2015). In can be seen, even in comparison to other self-report measures, as a good instrument for screening or as an additional measure when testing for effectiveness of a treatment (Nezu et al., 2000). It can be sensitive as well to individual change, particularly in individuals with the lowest or the highest severity of disorder (Brouwer et al., 2013a).

To our best knowledge, this is the first normative data study of the BDI-II in the Czech Republic. Previous research of this instrument (Preiss & Vacíř, 1999) tested only a smaller number of young men, hence it is not surprising that the results of the present study differ. The data provided in this thesis are a valuable tool, since it helps to compare the score obtained from an individual with the average score in the Czech population according to basic demographic characteristics. This normative data play an important role in clinical practice and differential reasoning. However, while evaluating the level of depression severity, it is also important to take the premorbid level of the individual into consideration.

In order to be able to use the normative data provided in this thesis in clinical practice, it is important to compare the present results with the data obtained from clinical samples with different severity of depression and potentially with different affective disorders, such as major depressive episode, major depressive disorder, bipolar affective disorder or dysthymia. Item response theory-based methods may be also used for effective differentiation within different levels of severity. Cut-off points for clinical practice and for research as well as its sensitivity and specificity may then be evaluated. Concurrent and discriminant validity of the Czech version in comparison to various instruments evaluating depression and different concepts may also be investigated.

The present thesis also proposes new directions for future studies. For example, to our best knowledge, there has been no systematic meta-analysis of previous normative data studies, the only to be found in the literature is the systematic review by Wang and Gorenstein (2013b). It would be clinically meaningful regarding the significant differences in the mean BDI-II total score throughout the different normative data studies to define a meta-analytically derived normative mean and investigate the role of demographic variables and their contribution to the total BDI-II score.

Conclusion

The thesis gives a comprehensive overview of one of the most famous and commonly used instrument for evaluation of depressive symptoms – the BDI-II. Depression, as a disorder which the inventory is focused on, was described in terms of definition, classification and symptoms, which influence the scores in this inventory. Its neuroanatomical, neurobiological and neurophysiological correlates were depicted as well as its development, course and differential diagnostics. Attention was dedicated to different methods for the assessment of depression and to the BDI-II as one of these instruments in particular. Its history and various editions were presented and the measure was described in chapters about its administration, scoring and psychometric properties, as they were investigated in previous research. The validity of the BDI-II Czech version was evaluated on the basis of current results.

In the present study, the association between total sum scores in the inventory and three fundamental demographic variables – gender, age, and education – was investigated. Based on the present results, which revealed correlation with gender, and education, but not age, normative standards for the Czech version were developed. Correlations between items and demographic variables were also investigated. The internal consistency, item-total correlations and factorial structure were measured and compared to results of previous foreign normative and validation studies. The internal consistency was high, although slightly lower than in most of the previous studies. The factorial structure based on two factors, a somatic and a cognitive-affective one, was comparable to previous research.

Although this inventory belongs to the most famous and most often used questionnaires for measuring depression severity, it should still be kept in mind that it only represents an auxiliary method for the screening of depressive symptoms (Beck, Steer, & Brown, 1996). The diagnosis of depression should not be based only on results of this test, but rather on clinical judgment according to diagnostic criteria. The inventory may nonetheless serve as an additional measure, since it evinces a number of aforementioned advantages.

The present thesis is the first study in Czech environment, which provides similarly sizeable normative standards for adult population. The knowledge of what an examiner can expect from population is crucial for further differential reasoning in clinical settings. Clinical judgment should nevertheless focus also on specific items, which were endorsed, in order to evaluate the respondent's state as well as to design further potential treatment. It may be presumed that the normative standards provided by this thesis, despite the limitations mentioned above, may help to deepen the diagnostics of affective disorders and can be used for more efficient and standardised application of this instrument in both research and clinical practice.

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